THE BRICK-BUILDER

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A SKETCH OF THE LITERATURE OF CLAYS.

(Continued from May number.)

GEOLOGICAL AND TECHNICAL DISCUSSIONS OF CLAYS IN VARIOUS STATES.*

ALABAMA.

"The Clays of Alabama" is the title of an article by Eugene A. Smith, State geologist. It is published in the proceedings of the Alabama Industrial and Scientific Society, Vol. II., 1892.

CALIFORNIA.

In the Eleventh Annual Report of the California State Mining Bureau, published in 1892, there are articles on the most famous of the Pacific Coast clays, which include those in Amador, Marin, Placer, and Sutter Counties.

NEW JERSEY.

In Vol. VI., Transactions of the same Institute, Prof. J. C. Smock published a valuable discussion of the clays of New Jersey, the material of which, however, has been more fully treated of in the clay reports of the Geological Survey of that State, mentioned above. This paper, which was read before the Institute, was followed by a discussion by different members, bearing on the origin of the clays, and especially on the presence in them of titanium.

NEW YORK.

Concerning the clays of New York State, several papers have been published by Heinrich Ries. Among these is one which has the following table of contents, that best shows the nature of the paper: "CONTENTS.— General Remarks on the Clays; Clay Deposits of the Erie, Ontario, St. Lawrence and Champlain Watershed; Clays of the Mohawk and Hudson River Watershed; Clays of the Delaware and Susquehanna Watershed; Staten Island Clays; Long Island Clays." It is a concisely written paper and full of information.

Another paper by the same author may be found in the Tenth Annual Report of the State geologist of New York for 1890. It is a valuable article describing the Hudson River clay banks and clay works.

PENNSYLVANIA.

The State of Pennsylvania has numerous accounts of its valuable clay and kaolin deposits distributed through a number of volumes, and any one seeking information concerning the clays of any part of Pennsylvania should look in the State Geologist's Report for the county in which they occur.

WISCONSIN.

In a paper entitled "Mineral Resources of Wisconsin," by Dr. R. D. Irving, late Professor of Geology in the State University of Wisconsin, published in Transactions of American Institute Mining Engineers, Vol. VIII., the author briefly discusses the brick clays of the State, which he says have practically all been deposited by a former extension of the lakes beyond their present size. They are all "characterized by the presence of a large amount of carbonate of lime." The clays bordering Lake Michigan are extensively worked, those on Lake Superior are not yet used; the white or cream-colored bricks, known as Milwaukee bricks, are made from this formation. Attention is called to the fact that cream-colored bricks are made of a clay which often contains more iron than that from which the red-burned bricks are made. "The white bricks are burned at a very high temperature and lose their color only at incipient vitrification." The brick burns cream color owing to the presence of a large amount of carbonate of lime. Ordinary clay burned with oyster shells will give the same result.

In the interior of the State at various places red bricks are made from residuary clays.

The author next discusses at greater length the existence of kaolin in Wisconsin. The localities are confined to a belt of country about fifty miles in latitude, stretching east from Black River in Jackson County to the vicinity of Grand Rapids.

The nature of the kaolin occurrence and its geological origin is discussed, and its probable continuous existence in narrow bands crossing the country in straight lines parallel to the general strike of the rocks. It is essentially a decomposition produced from beds interstratified with the Laurentian rocks. The kaolin is confined almost entirely to the "driftless" area, or that region which was not covered by the ice in the last great glacial period, the absence of the kaolin in other parts of the State being attributed to its removal by the ice sheet.

A table of twenty-five more or less complete analyses of these kaolins is given.

GEOLOGICAL DISCUSSIONS NOT INCLUDED IN THE ABOVE.

Among a large number of publications on various clays considered essentially as geological formations, there are a few so important to the student of clays in general that they well deserve mention here. One of these is Bulletin No. 52 of the United States Geological Survey, by I. C. Russell. It is entitled "Subaërial Decay of Rocks, and Origin of the Red Color of Certain Formations." It is a thoroughly scientific and comprehensive treatment of the subjects discussed, and contains at the end a long list of papers relating to the same problems.

Prof. W. O. Crosby, of the Massachusetts Institute of Technology, has published a valuable contribution under the following title: "On the Contrast in Color of the Soils of the High and Low

*Other references to the literature of clays in certain States were given in the preceding number, under the heading, "Industrial Publications."

Latitudes," much of the subject matter of which belongs to clays. It is in the nature of a reply to some of the conclusions drawn by I. C. Russell, whose paper is mentioned above.

Prof. Crosby is also author of a paper "On the Composition of Till or Boulder Clay," each of these papers being published in the proceedings of the Boston Society of Natural History; the former in Vol. XXIII., the latter in Vol. XXV.

The *Canadian Naturalist*, new series, Vol. VI., has a paper by Sir J. W. Dawson, on the "Post-pliocene Geology of Canada," in which may be found an account of the so-called Leda clays and of the till and boulder clays of that country.

In a work entitled "The Geology of England and Wales," by H. B. Woodward, the different clay formations are treated of, geologically, and following the description of each geological formation, in special parts entitled "Economic Products," the clays of the various formations are considered from that standpoint.

W. J. Henwood, in his work on the "Metalliferous Deposits of Cornwall," in describing the St. Agnes and Perram-Zabuloe districts, describes the china clay deposits of that vicinity and gives theories of their origin.

Among the reports on the scientific results of the voyage of H. M. S. "Challenger" is that on "Deep Sea Deposits," by John Murray and A. F. Raynard, which contains elaborate treatises on the clays and clay formations of the deep seas and the marginal regions of the ocean shores. These are not only extremely valuable and interesting in themselves, but are further useful in enabling us to get a better idea of the origin of the clay beds which we find at present on our continents.

In the August number of 1892, of the *London Geological Magazine*, G. W. Bulman appears as the author of a paper on under-clays, which he terms a "Preliminary Study." It is an interesting study of the beds of clay which underlie coal deposits.

PAPERS DEALING TECHNICALLY WITH THE QUESTIONS OF ORIGIN, COMPOSITION, AND PROPERTIES OF CLAYS.

The *American Journal of Science* contains a few very important papers in connection with the subject of clays. The first of those to be mentioned here was published in 1867 in Vol. XLIII., by S. W. Johnson and J. M. Blake, on "Kaolinite and Pholerite," which the authors show to be toughened, crystallized minerals, hydrous silicates of alumina, and the basis of our clays.

A very important study of kaolinite is also to be found in the *Mineralogical Magazine* for May, 1888, London, by Allan Dick. It contains, besides a thorough study of the mineral, a number of illustrations showing the appearance of kaolinite crystals and plates under the microscope.

Another paper on clays referred to as published in the *American Journal of Science*, is in Vol. CXLII., third series, 1891, by R. N. Brackett and J. Francis Williams; it is a description of two newly discovered minerals called Newtonite and Rectorite. It is a mineralogical paper and discusses the chemical and optical character of these minerals and shows their relation to the other minerals of the kaolinite group.

Any one desiring to learn the details about the kaolinite minerals (the hydrous silicates of alumina, and the basis of clays) should turn to the last edition of Dana's "System of Mineralogy," where a full account of these minerals is given, with numerous references to other authors.

In the March number of the *Monthly Microscopical Journal*, H. C. Sorby, in his annual address, as president of the society, discusses the application of the microscope to geology, and, among other things, the microscopical character of sands and clays, the origin of the material, and the identification of the constituent minerals.

In the April, June, and July numbers of the *London Geological Magazine* of the year 1891 there is, first, a paper by W. Maynard Hutchings, entitled "Further Notes on Fire-clays, etc." It deals essentially with the scientific examination of certain fire-clays for the purpose of determining the origin of rutile needles and of titanium, which is such a universally distributed element in clays.

In the next succeeding number of the same journal this paper is severely criticised by Major-Gen. C. A. MacMahon, and is in turn defended by the author in the number following.

The December number of this same magazine for the year 1887 contains two very interesting scientific articles on clays. The first is by J. J. H. Teal, on "The Occurrence of Rutile Needles in Clay"; the second on "The Nature and Origin of Clays and the Composition of Kaolinite," by J. H. Collins. This paper is well worth the study of any one interested in the subject, though an abstract of it would be perhaps too technical for an article of this kind.

There is an article bearing on the origin of clays in the *American Journal of Science*, Vol. XXIX., third series, 1885. It is entitled "Suspension and Sedimentation of Clays," and is by William H. Brewer. It is an excellent discussion of the subject based on experiments by the author, and calls to mind a more exhaustive treatise on the same subject, which goes into the mathematics and physics of the phenomena, by Dr. Carl Barus, which is published as Bulletin No. 36 of the United States Geological Survey, on the "Subsidence of Fine Solid Particles in Liquids."

Prof. H. O. Hofman and C. D. Demond, of the Massachusetts Institute of Technology, have published this month, in the Transactions of the American Institute of Mining Engineers, an account of some experiments for determining the refractoriness of fire-clays. It discusses briefly the methods for such determinations, and describes a series of experiments made by the authors, based on the possibility of obtaining comparative results by diluting different clays with similar proportions of fluxes, and observing the effects of heat upon them under these circumstances. The method was original, and will lead to valuable results.

In the Bulletin, Nos. 5 and 6, 1887, de la Société Française de Mineralogie, is an article entitled "De l'Action de la Chaleur sur les Argiles," by Prof. Le Chatlier. It is a technical account of some experiments of his in thermo-chemical lines, the author arriving at the chemical formulæ of the clay minerals through the detection of variations in the temperature, under certain conditions, due to the release of the molecules of water from the hydrous silicate of alumina, on being heated.

A large amount of information concerning the nature and properties of clay is to be found in the publications on soils of Prof. Milton Whitney, of the Maryland Agricultural Experiment Station.

GERMAN PUBLICATIONS.

There are many publications in the German language on the subject of clays of exceeding value. Among these perhaps the two most important single publications are those respectively of Bruno Kerl, entitled "Handbuch der gesammten Thonwaarenindustrie," published in 1879, and that of Carl Bischof, entitled "Feuerfesten Thone," published in 1876, a new edition of which is said to be now in print. They are works which should be in the library of every clay manufacturer understanding the German language.

The German periodical devoted to clay industries, and entitled *Thonindustrie Zeitung*, is probably the most thorough in its treatment of subjects interesting to clay workers of any similar journal published in the world.

This brings to an end the list which the writer had in mind on beginning this sketch. It might be perhaps indefinitely enlarged, but without further trespassing on the field covered by the bibliography of Champfleury, described above, or looking to the languages which are but little used in this country, it seems to the writer that there is here a line of demarcation, containing the group of works discussed, and separating them from a mass of similar literature, which is mostly of less importance to the general reader. If among a thousand references which the writer has at hand, there are many deserving recognition in a sketch of this kind, which have been omitted here, the cause may have been either the writer's oversight or judgment in the matter.

GEORGE EDGAR LADD.

CAMPANILE OF THE PALAZZO DEI SIGNORI, VERONA.

SUPPLEMENTARY ILLUSTRATION TO "BRICK AND MARBLE IN THE MIDDLE AGES."

BRICK AND MARBLE IN THE MIDDLE AGES.

(*Continued.*)

CHAPTER VI.

"Come, go with me. Go, sirrah, trudge about
Through fair Verona."
— *Romeo and Juliet*, act i., scene 2.

VERONA: CAMPANILE OF THE PALAZZO DEI SIGNORI — STA. ANASTASIA — MONUMENTS — PIAZZA DELL' ERBE — THE DUOMO — THE BAPTISTERY — STA. MARIA L'ANTICA — CEMETERY AND PALACE OF THE SCALIGERS — DOMESTIC ARCHITECTURE — PIAZZA DI BRÀ — THE AUSTRIANS — PONTE DI CASTEL VECCHIO — SAN ZENONE — SAN FERMO MAGGIORE — CHAPEL NEAR THE DUOMO — ROMEO AND JULIET — DWARFS — WELLS.

WE reached Verona in the evening, and were up early on the next morning, anxious to get a general idea of the city. But I was no sooner out of my bed than I saw from my window, over the roofs of the opposite buildings, the Campanile of the Palazzo dei Signori, a lofty, simple, and almost unbroken piece of brickwork, rising, I suppose, at least three hundred feet into the air, and pierced with innumerable scaffold holes, in and out of which, as I looked, flew countless beautiful doves, whose choice of a home in the walls of this tall Veronese tower will make me think kindly of putlog-holes for the future. Certainly, if the Italian and English principles of tower-building are to be compared with one another, the Italian need give no fairer example of its power than this simple, grand erection.

It rises, as we found afterwards, out of a large pile of buildings, and for a short distance above their roofs is built in alternate courses of brick and a very warm-colored stone, and then entirely with brick, pierced with only one or two small openings, and terminating with a single belfry-stage; the belfry windows, with their arches formed without mouldings, and with the sharp edges only of brick and stone used alternately, are divided into three lights by shafts of shining marble; the shafts, being coupled one behind the other, give strength with great lightness, and are very striking in their effect. These windows have, too, remarkably large balconies, but without balustrading of any kind. The upper and octangular stage of the campanile is comparatively modern, but rather improves the whole effect than otherwise.

I could hardly tear myself away from this noble work; but much more was to be seen, so I dallied not long before I set forth on a journey of discovery, giving myself up gladly to sketching and ecclesiology.

The hotels of Verona are both of them near Sta. Anastasia, and at the eastern end of the long and, at first, narrow and picturesque Corso. The Adigè separates the city from its eastern suburb, and from the hills crowned by the Castel San Felice and the picturesquely stepped city walls. Its yellow waves wash with an angry rush the foundations of the houses which overhang it all along its course, but the only views of it are to be obtained from the bridges and from the open space near the Castel Vecchio. At the extreme northwestern angle of the town stands the church of San Zenone. One soon finds one's self constantly on the Corso, and to the north of this lie the cathedral Sta. Eufemià, the Castel Vecchio, and San Zenone; whilst to the south of it are the tombs of the Scaligers, San Fermo Maggiore, the Roman Amphitheatre, and the Palazzo Publico. Without further attempt to describe the map, let us visit the buildings, of which the list I have given, though by no means exhaustive, includes the finest.

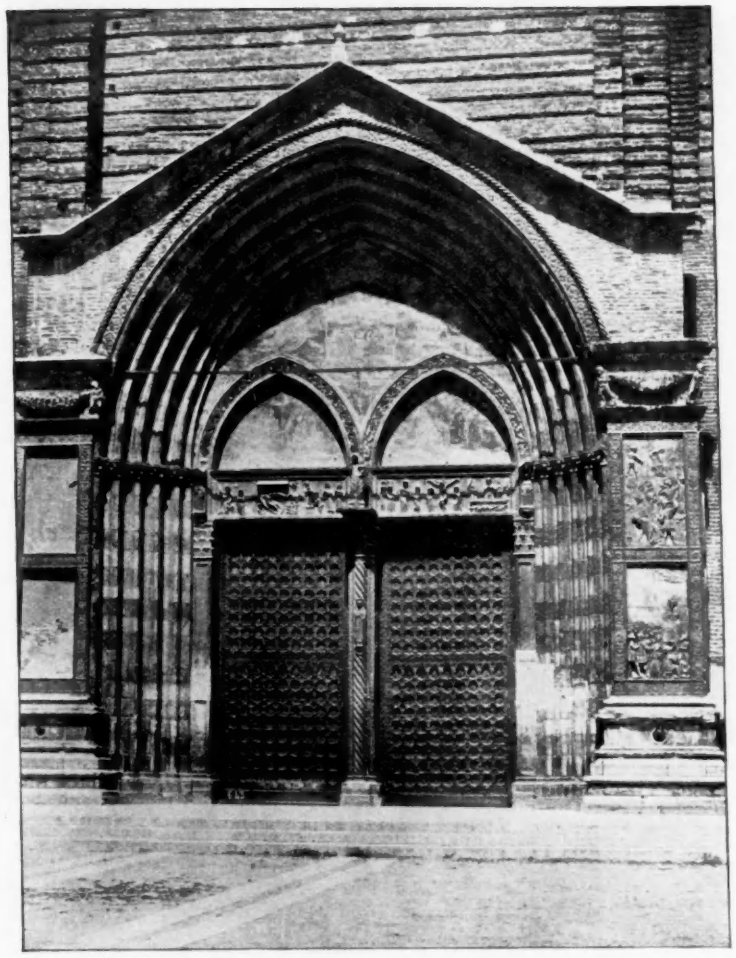
The Veronese architects in the Middle Ages were certainly some of the best in Italy. San Zenone is by very much the finest church of its kind that I know; Sta. Anastasia is, on the whole, one of the best churches of a later date; and San Fermo Maggiore affords some of the best detail of brickwork; and the tombs of the Scaligers are the best examples of monuments in all Italy.

The first thing seen on turning out of the hotel is the west front of Sta. Anastasia* looking so beautiful at the end of the narrow street, whose dark shade contrasts with the bright sunshine which plays upon its lofty arched marble doorway and frescoed tympanum, and lights up by some kind of magic the rough brickwork with which the unfinished church has been left, so brightly, that, as you gaze, thoughts pass across your mind of portions of some lovely painting, or some sweeter dream; you feel as though Fra Angelico might have painted such a door in a Paradise, and as though it were too fair to be real. There, however, it is, rich and delicate in color, shining with all the delicate tints of the marbles of Verona, pure and simple in its softly shadowed mouldings, beautiful in its proportions, and on a nearer approach revealing through the dark shade of its opening, and over and beyond, the people, who early and late throng in and out the vague and misty forms of the solemn interior.

Sta. Anastasia is one of the most complete and representative pointed churches in the North of Italy, and deserves, therefore, a rather detailed description. Its date is about 1260 to 1290. The ground plan is very simple — a nave of six bays, then one which is the crossing of the transepts, a very short choir of one bay finished with an apse, and two chapels on the east side of each transept. The nave aisles are narrow, and the whole design is characterized by intense simplicity of detail and arrangement. The width of the nave, and the height of the columns and arches, give, on entering, an idea of vast space and size. The columns are very simple, cylindrical in section, and support arches built

*A photograph of this will be published in the next issue.

of brick, and only chamfered at the edge; from the caps of the columns flat pilasters run up to the commencement of the groining, and above the nave arcades there are two small circular openings, one in the place of a triforium, opening into the roof of the aisle, the other above it and larger, filled in with plate tracery in stone, and forming the clerestory.

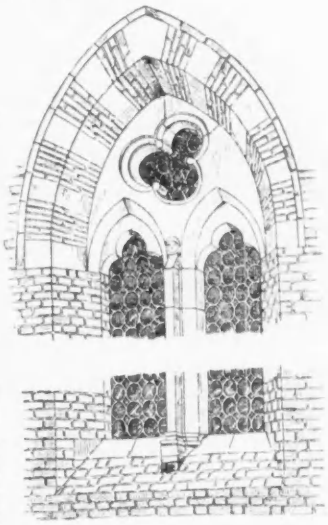


WEST DOORWAY, STA. ANASTASIA, VERONA.

SUPPLEMENTARY ILLUSTRATION TO "BRICK AND MARBLE IN THE MIDDLE AGES."

But if the walls are beautiful in their color, not less so is the pavement, which, from one end of the church to the other, remains to this day to all appearance just as it was on the day that the church was finished. The nave and transepts are all in one pattern; the spaces between the columns in a variety of beautiful designs, and divided from the nave and aisle pavements by a strip of white marble on each side; and the aisles again are on the same scheme throughout. The colors of the marble used are white, red, and bluish gray, and the patterns very simple and generally geometrical in outline; and there is a quiet richness of effect in their arrangement which is exceedingly beautiful. Such a pavement must unhappily be forever Italian, and we in England can scarce hope ever to attain to anything so exquisite; but we do not well to forget that by the mixture of a small quantity only of marble with our encaustic tiles we should attain to much greater beauty of effect than we can by the use of tiles alone, and there are many towns, as, *e. g.*, Plymouth, the very pavement of whose streets is of a material which might most advantageously be introduced, more often than it has yet been, inside the walls of our sanctuaries, as well as under the feet of every passer along the streets.

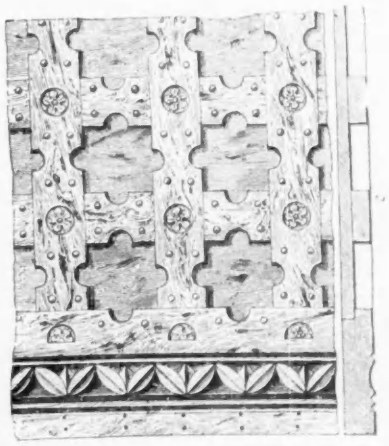
There are some monuments and paintings here quite worth looking at. The Pellegrini Chapel, next to the choir, has two fine trefoil-headed monuments in red marble with the background painted with subjects of about the same age (*circa* 1392); and in the Cavalli Chapel there is an admirably painted wall, against which has been put a monument which, though somewhat rude and coarse in its sculpture, nevertheless produces a very fine effect of color and architecture combined.*



The window tracery of Sta. Anastasia is rather singular plate tracery, consisting of mere piercings through the stone with very little moulding; most of the windows are of two very lofty trefoiled lights with circles and trefoils pierced above, very simple and severe, and remarkable for the quaint way in which the cusping is arranged, not with some reference to vertical lines, as is ordinarily the case with us, but just as fancy or chance seems to have dictated. The clerestory windows are circular openings cusped.

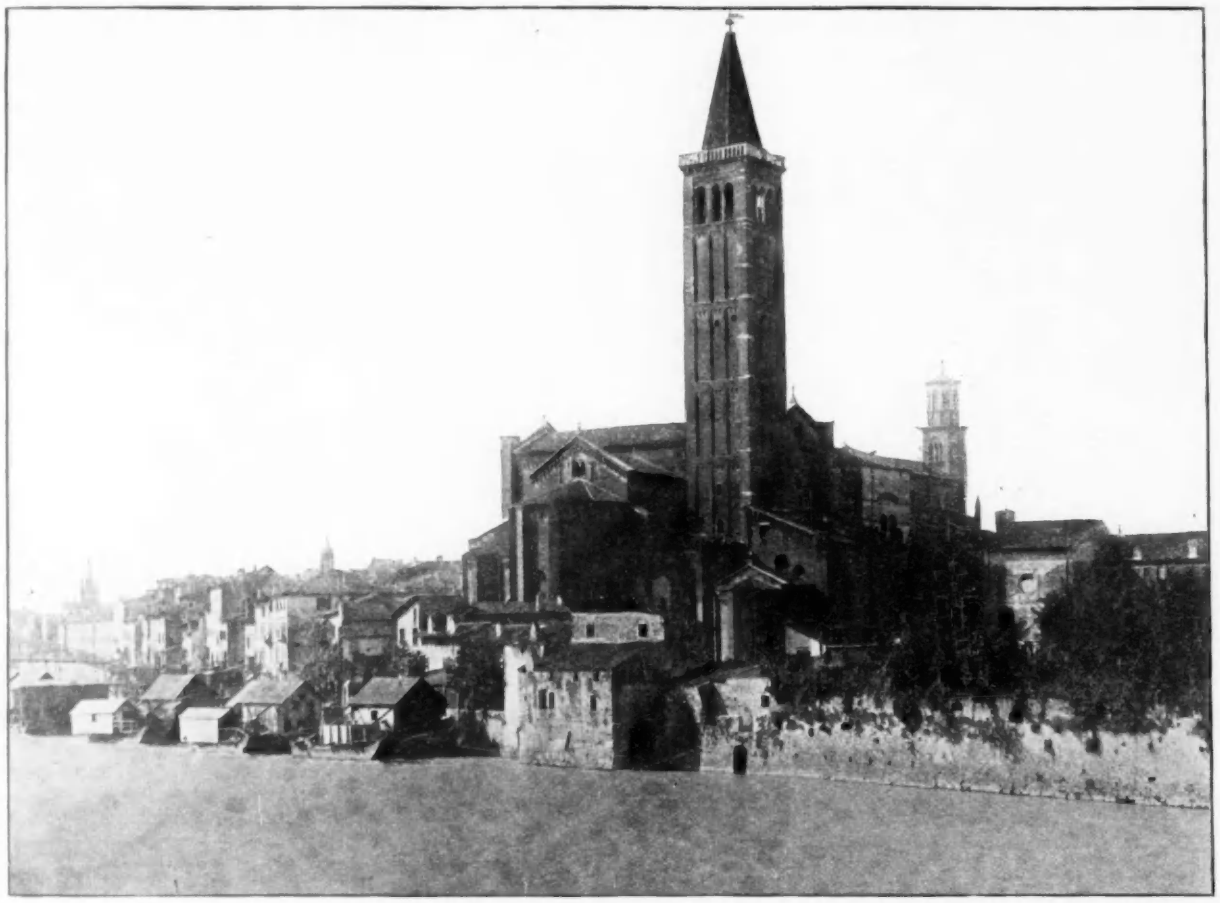
There is a curious but not very happily treated arrangement inside,—a step all round the inside walls, projecting some three or four feet from them, and panelled all round against the riser with a small trefoil arcading—the whole in red marble.

Externally, the church is almost entirely built in red brick, with rich cornices and rather ungainly buttresses and pinnacles of brick; the windows have brick jambs with stone tracery, and on the north side of the choir is a fine, lofty campanile, finished at the top with a low, very plain, and octangular capping, and unpierced with openings, except in the belfry stage. Of the west front only the doorway has been completed; this is in courses of red, gray, and white marble, and most effective; the rest of the front is left in brick, finished exceedingly roughly, with a view to leaving a key for the marbles with which, no doubt, it was intended to veneer the entire front. The wooden framework of this door, of which I give a detail, is very curious; it is of deal, coeval with the doorway, and the framework is external, not internal.



(*To be continued.*)

* An extremely careful chromo-lithograph of this wall and monument has been issued by the Arundel Society, accompanied with a notice of both, written by Mr. Ruskin.



VIEW OF THE REAR OF STA. ANASTASIA, VERONA.
SUPPLEMENTARY ILLUSTRATION TO "BRICK AND MARBLE IN THE MIDDLE AGES."

THE ART OF BUILDING
AMONG THE ROMANS.

Translated from the French of Auguste Choisy by
ARTHUR J. DILLON.

CHAPTER II.

CONSTRUCTION OF RUBBLE VAULTS.

RUBBLE vaults were nowhere in such general use as among the Romans, and the ruins of their edifices are filled with the debris; everywhere masses of rubble boldly thrown into space are found covering the ancient halls, or where they have been destroyed the fragments of overhanging masonry still stand as witnesses of the original structure, and mark for us the vaults which time has overthrown.

These vaults, formed of small materials, were of infinite variety and one sees them covering rectangular and polygonal spaces, rotundas and exedras, for being, as it were, moulded, they could be adapted to the most varying forms, and could be made to meet all of the most numerous requirements of planning. Many of them, moreover, seem to have been made to defy centuries, and the majestic simplicity of their forms imparted to the edifices a severe grandeur most expressive of the great Roman power. There has never been a style of architecture better adapted to the moral and material needs of a people, and one can comprehend why the Romans founded their entire architecture on this system.

The problem of replacing wooden scaffolding by constructions at once more durable and more solid is as old as the art of building; but before the appearance of rubble vaults no really practical solution was known. The stone tiling or lintels of the Egyptians and Grecian temples required materials hard to quarry and expensive to work. In early architecture one comes across some vaults made of overhanging rows of stones; one even finds vaults composed of keys, the joints converging to a horizontal axis, but through ignorance or system the builders of primitive times nearly always laid the keys of their vaults dry, interposing between the blocks no cement, mortar, or other material to compensate for the irregularities of the stones. For this reason they were obliged to make them very exact in form, and thence arose difficulties which evidently limited the applications to which cut-stone vaults would otherwise have been susceptible. Of the ancient people the Etrurians were those who made the greatest use of cut-stone vaults, but even they used them to no great extent. They vaulted sewers, the subterranean drains of marshy plains, aqueducts, and the gates of their towns, but never the buildings adapted to domestic life or even their religious edifices. For these they used wooden beams like those of the Tuscan temple described by Vitruvius, or stone architraves similar to those imitated in the façades of some of the still existing rock-cut temples.

In spite of their constant intercourse with Etruria, the Greeks do not seem ever to have thought of imitating the vaults with radiating joints which the Etruscans used. In the primitive Greek buildings at Mycenæ, and more often in those of the island of Eubœa, one finds vaults made by corbelling, but before the Roman conquest the Greeks never accepted vaults with radiating joints. Their architects had given the highest expression of the ideas of regularity and order to

the construction with lintels, and to these forms they were attached as being the most beautiful creations of their genius, a part of their national glory, and they kept to them as long as their independence lasted. So that though they witnessed the rise of vaulted construction they took no part in it, and left to the architects of Italy the honor of making of it a general system, simplified and rendered practicable by the employment of small materials artificially combined.

The Romans may or may not have been the inventors of rubble vaults, that is to say, of vaults of small stones bound together by mortar, but at any rate no one before them thought of constructing vaults of large span of such material. For a long time they themselves seem to have been ignorant of or to have neglected the resources which this system of construction offered, and we do not find it generally used until the last century before the Christian era. It seems to have been developed during the period of material prosperity which followed the foreign conquests and the quelling of civil discord. Its progress was then very rapid, and a veritable revolution took place in the art of building. Once that vaults were adopted for covering great halls, an entire change of plan became necessary, for the grouping of the halls had to be changed in order to obtain sufficient abutment to the thrusts, and the points of support, subject to a new system of strains, took entirely new forms. Up to this time the Roman architects had, so to speak, lived on the stores of the Greeks and Etruscans, and it was not until this period that processes of building were freed from the fetters of tradition, and that an entirely new system of construction, really Roman, was born, or, at least, was formulated and made general.

Doubtless the transformation accomplished during the last days of the Republic had been in preparation a long time; but either because, during the long intervals which separate us from the Romans, the first examples of vaulted construction have disappeared, or, as would seem more probable, have given place to the more sumptuous edifices erected by the emperors, all traces of the interesting series of attempts and improvements which preceded the reign of Augustus have been effaced. The Pantheon presents itself as the masterpiece of Roman art, and at the same time as one of the first monuments of its history, for examples of a previous date are too few or too uncertain to mark the gradual progress of the art of building during the Republic. We shall not try to establish its origin and progress by conjectures, but shall at once examine the completely developed rubble vaults; we shall give the circumstances of their construction, and try to connect them by a few simple ideas which seem to dominate the whole Roman system of vault building.

If one examines an edifice vaulted with rubble, for example, one of those long lines of aqueducts which cross the Roman Campagna, he will perceive on the face an arch of brick or stone with radiating joints, and behind these principal arches a rough masonry made of fragments of tufa or a debris of tiles, resembling béton. In other words, a summary inspection of the ruins seems to reveal a compact mass of rubble, enclosed by two revetments with radiating joints. But if one examines these masses of masonry more closely, which at first sight seem to be rough and crude, he discovers courses of an entirely separate construction embedded in them, real ribs, sometimes entire networks of brick forming skeletons in the body of the rubble, slender frames which branch out and extend through the midst of the rough masonry which encloses them.

This skeleton must not be considered as a series of resisting arches, built at the same time as the rubble and intended to strengthen it, as something analogous to the courses of stone in modern buildings. The chains of brick embedded in the Roman vaults were built first, the rough masonry being made subsequently, as is shown by the lack of accordance between the courses of brick and the courses of rubble. (Fig. 8.)

This light frame or skeleton embedded in the vault, as well as the principal arches which terminate it, is made of bricks, with radiating joints, and to a certain extent its construction resembles, in this respect, that of our masonry vaults. The likeness ends here, however, and if we leave the interior framework of the vaults to examine the rubble itself, we shall find in its mass a simplicity of construction entirely different from any modern methods.

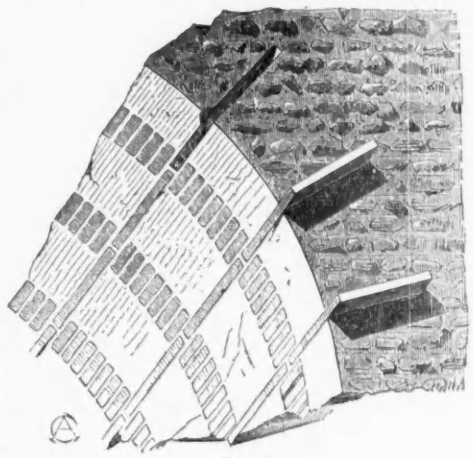


Fig. 8.

The word "vault" gives the idea of a structure where the joints are all directed towards a common centre, and this, in fact, corresponds to the structure of Romanvaults of cut stone with dry joints, and also, as we have just shown, to that of the brick arches found in the middle of the masonry like strong skeletons; but the idea is quite inapplicable to the rubble itself. The courses forming the body of a Roman vault of rough rubble are exactly horizontal from the springing to the summit, and seeing these beds so plainly marked in the ruins, one thinks involuntarily of the layers which are sometimes so clearly marked in a section of stratified earth. The arrangement of the joints and of the courses is so unusual that it may be useful to make it clear by a drawing, and I therefore compare in two sketches the interior appearance of vaults constructed after each system.

The direction of the joints of a modern vault are as indicated in

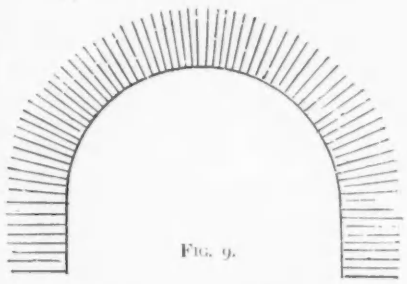


Fig. 9.

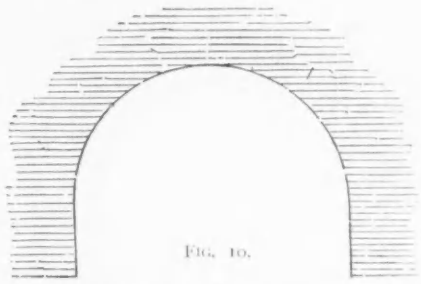


Fig. 10.

the first figure, and Roman vaults of dry-laid cut stone were also built this way; but in a Roman vault of small cemented materials the direction of the joints was, on the contrary, that represented by the second. (Fig. 10.)

Thus, according to whether they built in cut stone or small cemented materials, the Romans made the joints radiating or perfectly parallel. These two different systems do not imply any incoherence or any contradiction in ancient methods, for the conditions of equilibrium in vaults of dry-laid stones and in those of rubble were profoundly different. In one case the stones held only by reason of their shape, and, therefore, their joints had to be made to radiate; in the other, where the agglomerated material made one solid block of the whole, the beds of mortar and beds of stone were united in one continuous and homogeneous mass, and in respect to stability the direction of the courses was of no consequence. The Romans profited by this to introduce a great simplification in their works, boldly freeing themselves from conditions which were imposed by radiating joints. Hence it is that the masonry of their vaults is nothing else than an overhanging continuation of the imposts; and, omitting the frame work imbedded in the rubble of the vault, there remains a mass of masonry exactly like the walls which support it, in so far as the direction of the courses are concerned.

(*To be continued.*)

RECENT BRICKWORK IN AMERICAN CITIES

NEW YORK.

A DESCRIPTION of the brick and terra-cotta work of the past five years in this city would be almost a résumé of the building operations during that time, for the noticeable structures in which brick or terra-cotta is not an important factor are few and far between.

At a conservative estimate, ninety per cent of the buildings in process of erection at the present time are brick and stone, or brick and terra-cotta. To write adequately concerning the latest work only would require the pages of several issues of THE BRICKBUILDER; to cover the work of five years would prevent any mention of current work, if it did not prove an endless task.

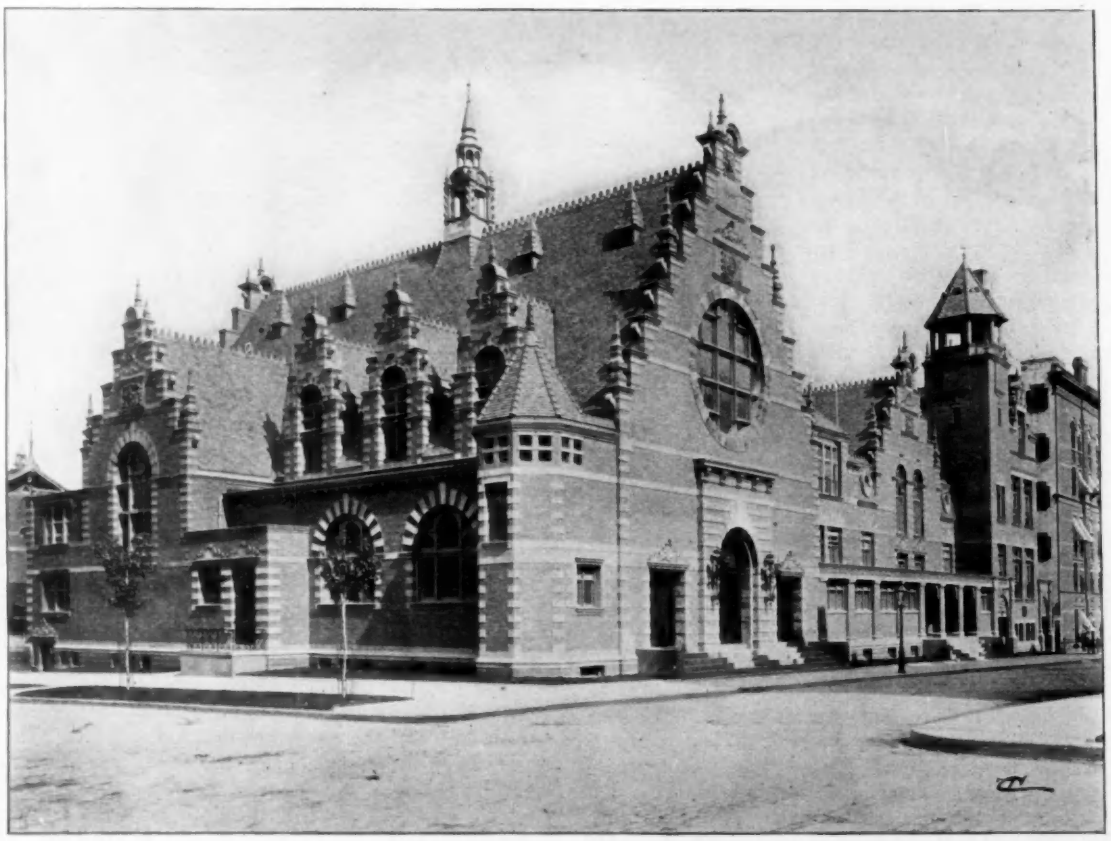
But of the older work, the best has been so well published already that it need not come within the scope of this correspondence, except when an occasional building becomes one of a group under consideration.

The most striking characteristic of recent work is the Renaissance craze which has followed the work of McKim, Mead & White, and which is extending throughout the country, just as the Romanesque craze did after Richardson's successful work. Here and there we see a really good thing, but the mass of it is mediocre, if not absolutely bad, its light color being its one redeeming feature. On this account alone, it is a welcome change from the stupid brownstone of twenty years ago. The dismal, uninviting aspect of many of our streets has been entirely transformed by the introduction of work in pleasing light color, which has broken the gloomy monotony of these rows of high-stoop brownstone fronts. Whatever their design may prove, upon individual examination, there are few that are not an improvement over the structures they have replaced.

Great as the change has been in the older parts of the city, it is not to be compared with the development of the new residential section on the west side, up town. In the matter of site, little is to be desired. It is located high above the Hudson, a bit of whose surface, with the picturesque western shore above it, closes every cross-street vista looking westward, and is bordered by Riverside Park. Much of the work already done is of a speculative character, but it is, much of it, above the ordinary, and some decidedly good, and well worth a visit.

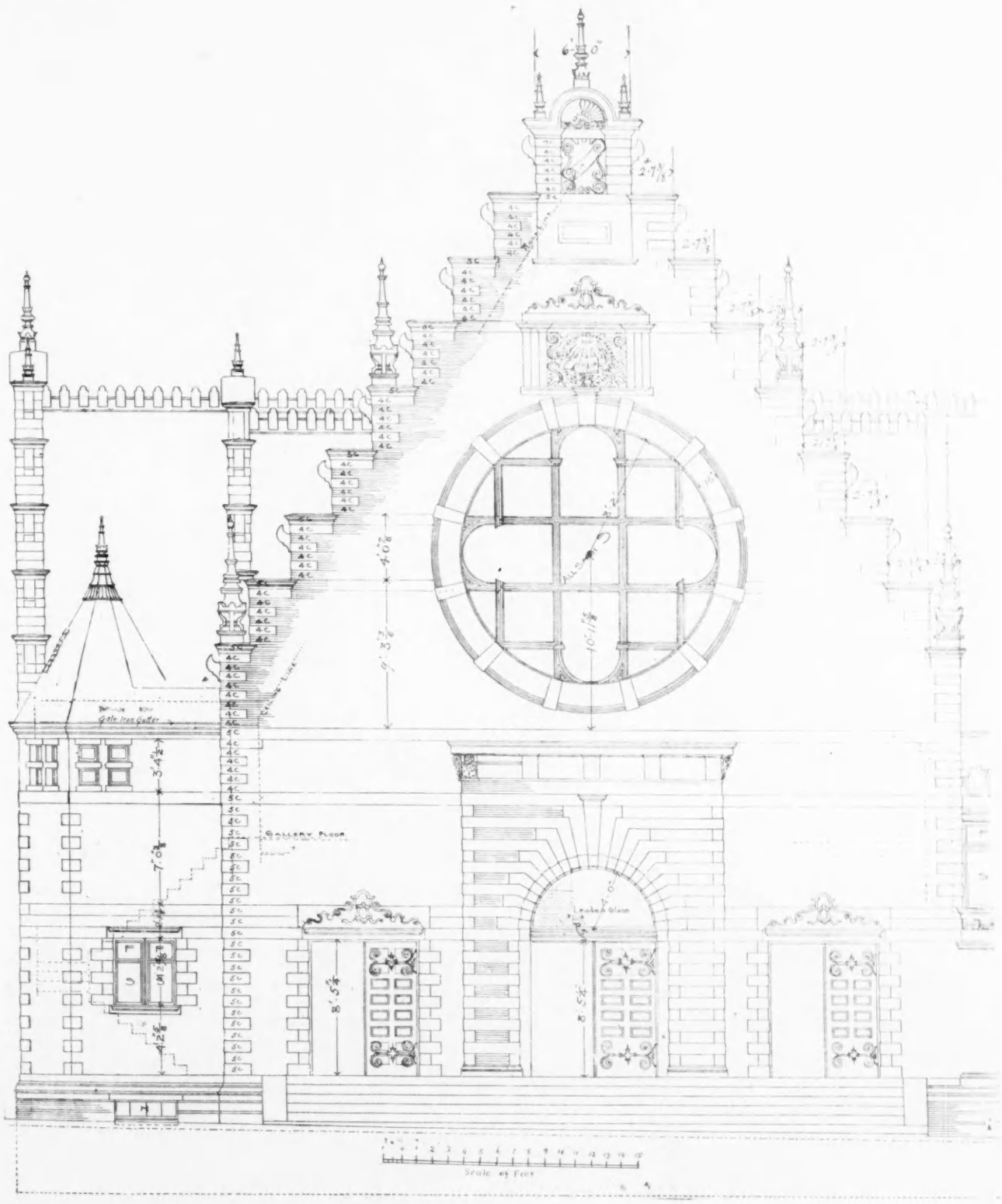
The two most striking examples in this section are so interesting and so instructive in the way of what may be done by working in the style of the Low Countries that it is worth while to give them tolerably complete illustration. There are other buildings in process of erection that might well be classed with these, among them the St. Nicholas Club, on Forty-fourth Street; but these two are, all things considered, the best types. One is Mr. Robert W. Gibson's Collegiate Church group, on the corner of Seventy-seventh Street and West End Avenue, a photograph of which is given below, and elevations and plan on pages following. It is a trifle strong in color, and may not prove on daily acquaintance so agreeable a composition as it does on occasional inspection. The wall surfaces are of tawny speckled brick, with terra-cotta trimmings to match the body color of the brick.

The design has often been criticised as a copy of the old meat market in Haarlem, but it is a very free and liberal copy, — so much so, that there are only two or three features that are essentially similar.



WEST END COLLEGIATE CHURCH, 77TH ST. AND WEST END AVE., NEW YORK. MR. R. W. GIBSON, ARCHITECT.

Speckled Brick supplied by Meeker & Carter, 14 East 23d St., New York. Terra-cotta made by the New York Architectural Terra-Cotta Company, 38 Park Row, New York.

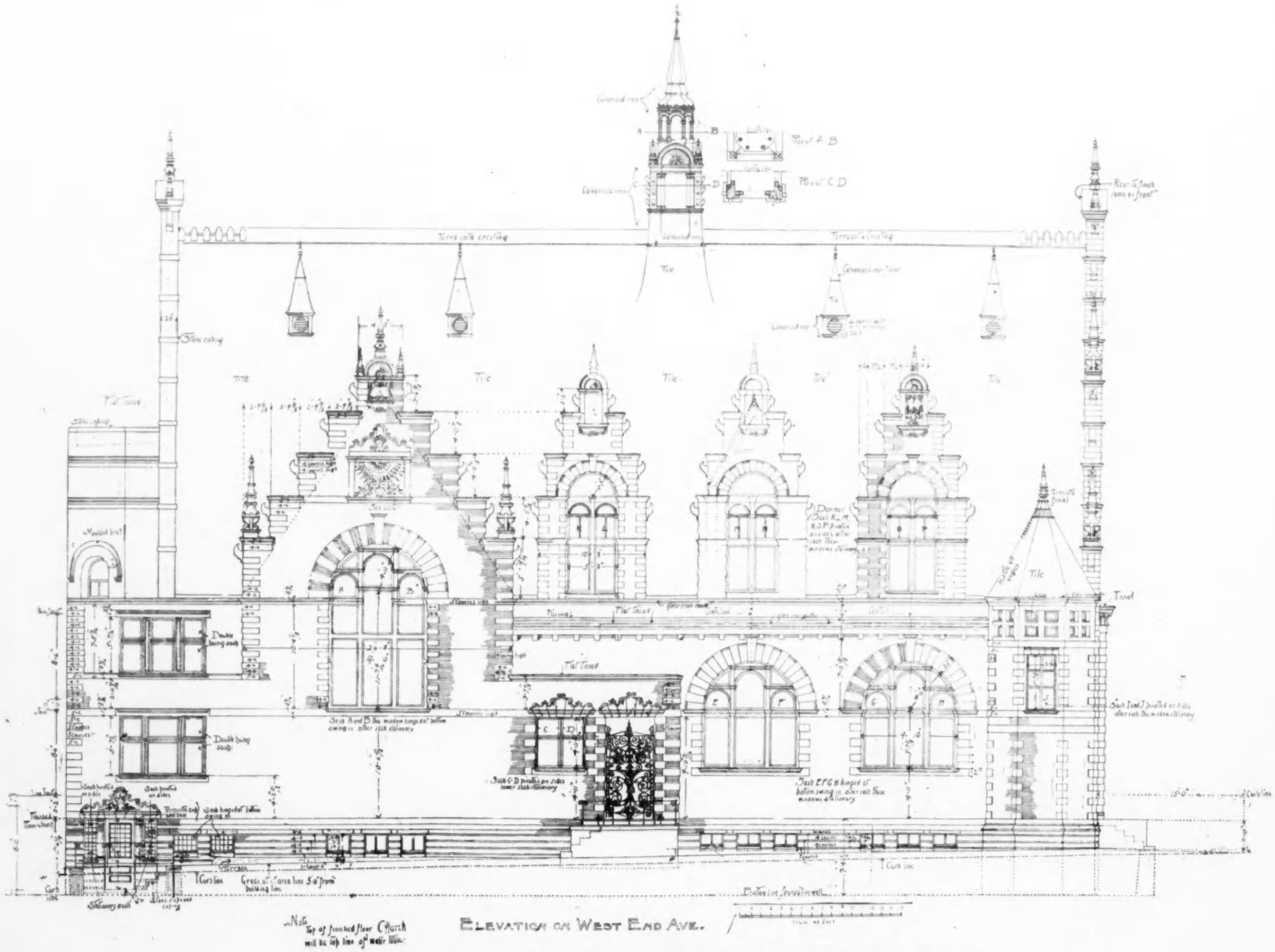


ELEVATION OF WEST END AVENUE COLLEGIATE CHURCH, NEW YORK CITY.

R. W. GIBSON, ARCHITECT, NEW YORK.

BRICK FROM MEEKER & CARTER, NEW YORK.

TERRA-COTTA FROM NEW YORK ARCHITECTURAL TERRA-COTTA COMPANY.



ELEVATION OF WEST END AVENUE COLLEGIATE CHURCH, NEW YORK CITY.

R. W. GIBSON, ARCHITECT, NEW YORK.

BRICK FROM MEEKER & CARTER, NEW YORK.

TERRA-COTTA FROM NEW YORK ARCHITECTURAL TERRA-COTTA COMPANY.

ELEVATION OF W. 77TH STREET

ELEVATION OF WEST END AVENUE COLLEGIATE CHURCH, NEW YORK CITY.

R. W. GIBSON, ARCHITECT, NEW YORK.

BRICK FROM MEEKER & CARTER, NEW YORK. TERRA-COTTA FROM NEW YORK ARCHITECTURAL TERRA-COTTA COMPANY.

HOUSES FOR R. G. PATTERSON, ESQ. ON WEST END AVE. BET. 59TH & 60TH STS. NEW YORK CITY.

Note:- In all cases figured dimensions are to be followed in preference to a scaled drawing.

See Revised Plan of Entrance Floor of Houses A and D.

Joint Line.

Curb.

Floor Heights for Houses A and B.

Building Line.

Curb Line.

Floor Heights for Houses C and D.

Floor Heights for Houses E.

A B C D E

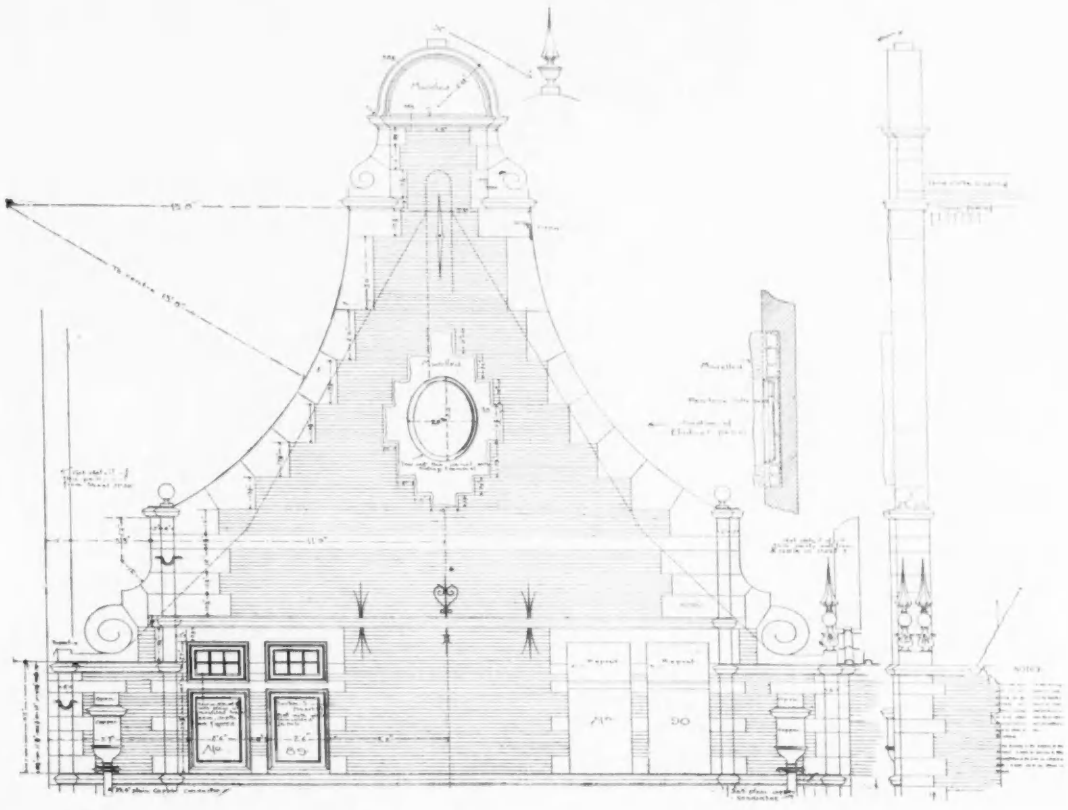
ELEVATION OF WEST END AVE.

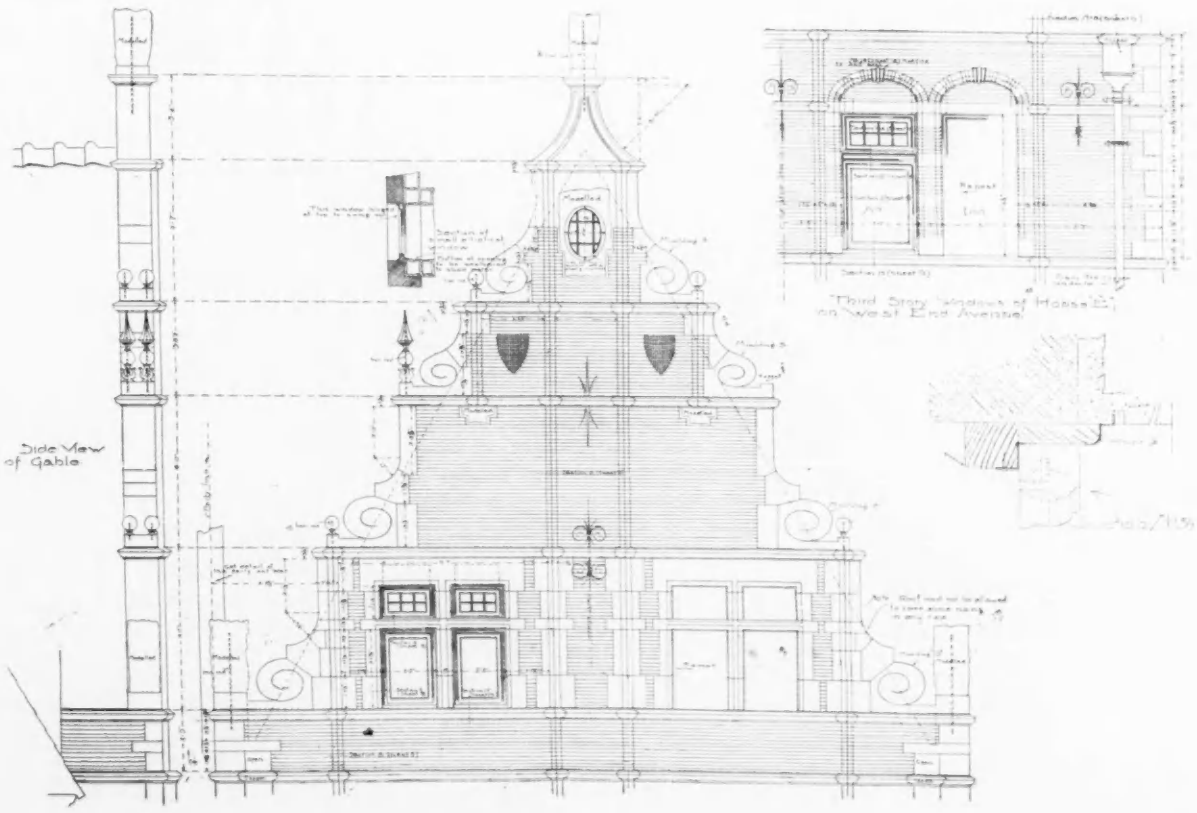
Frank Miles Day
Architect
915 Chestnut St. Phila.

Drawing No. 644-1
May 16th 1893
Scale 1/4 in = 1 foot.

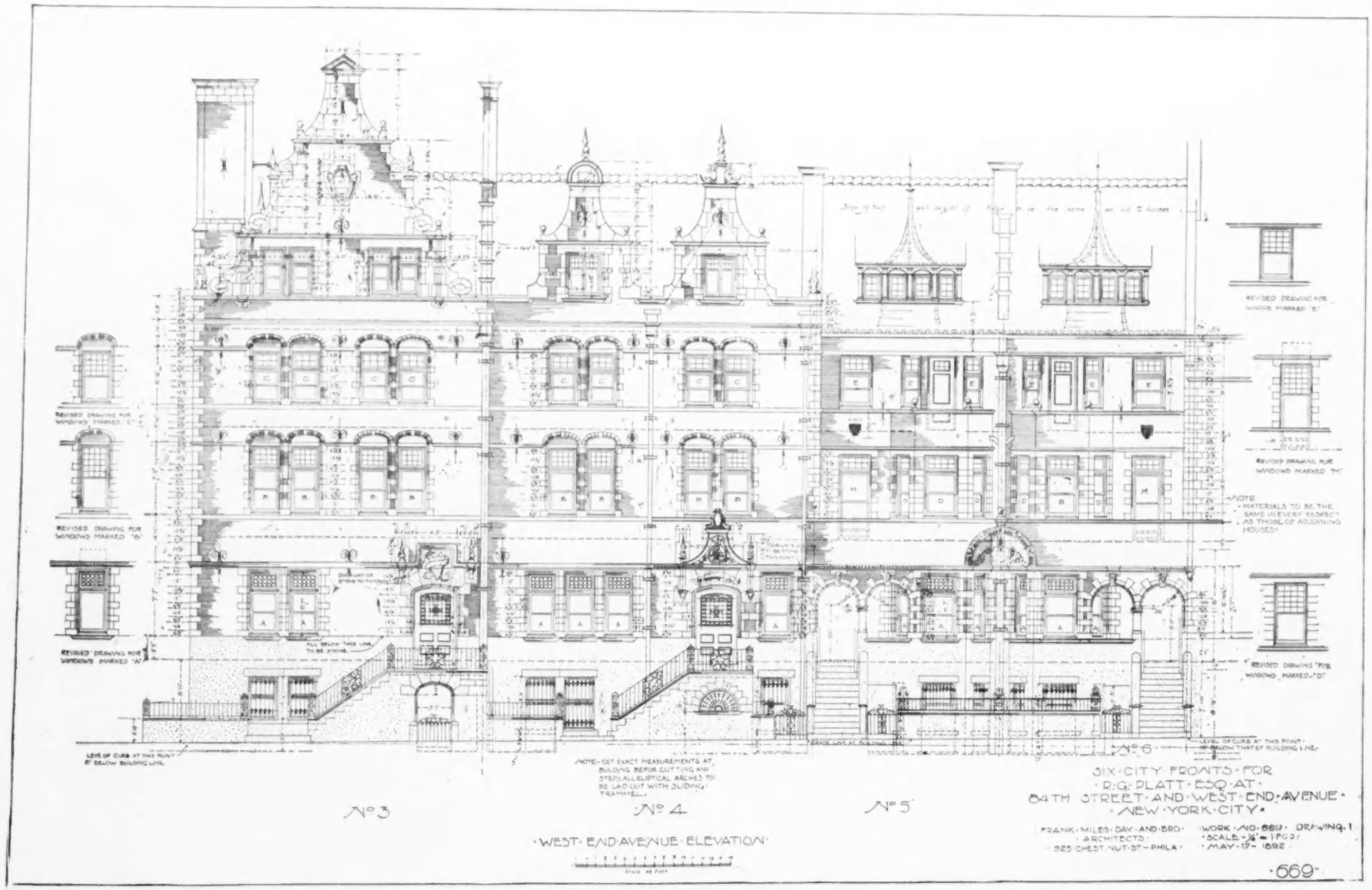
BRICK FROM MEEKER & CARTER, NEW YORK.

TERRA-COTTA FROM NEW YORK ARCHITECTURAL TERRA-COTTA COMPANY.



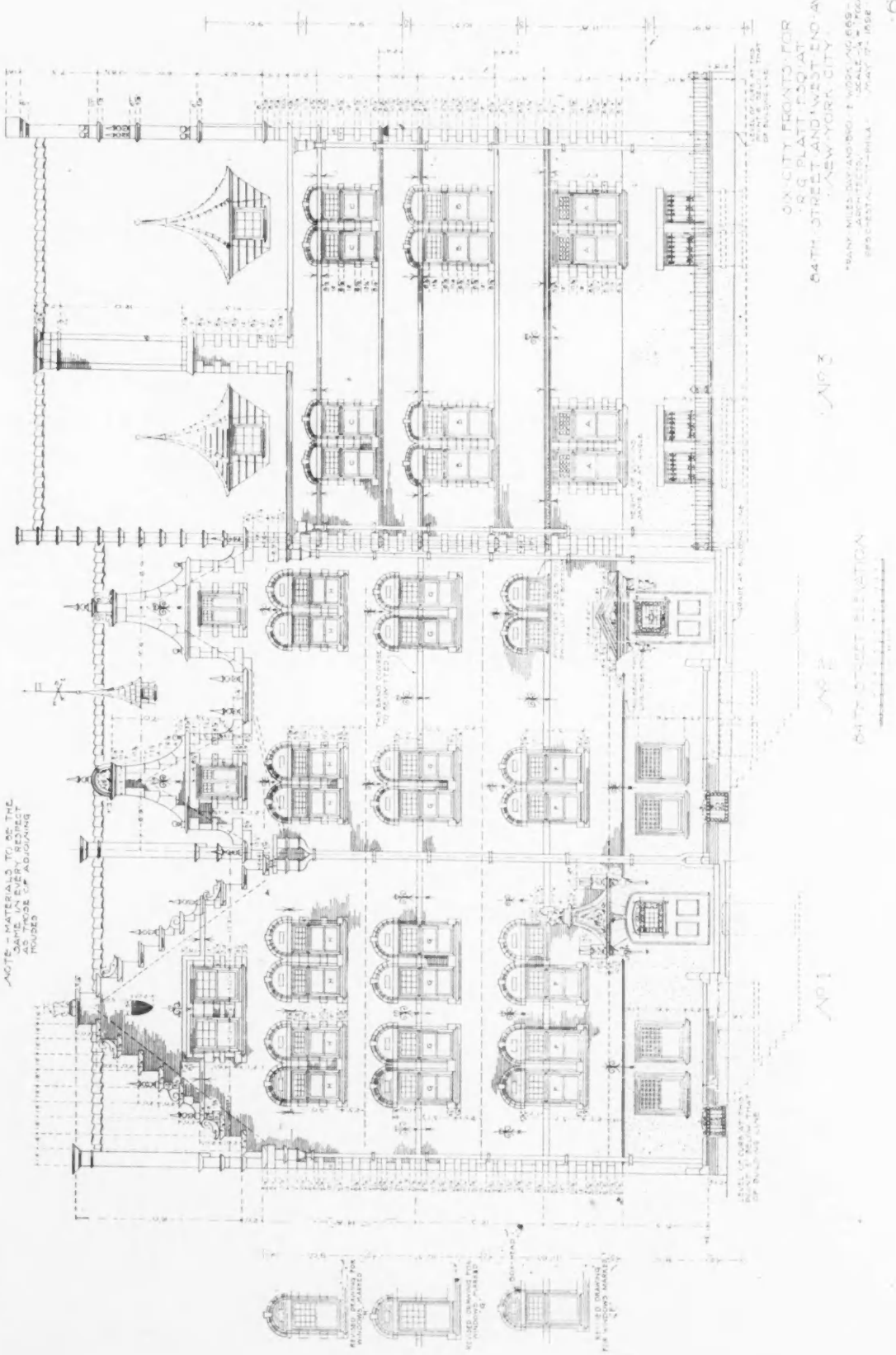


DETAILS OF GABLES ON ELEVATION ON OPPOSITE PAGE.



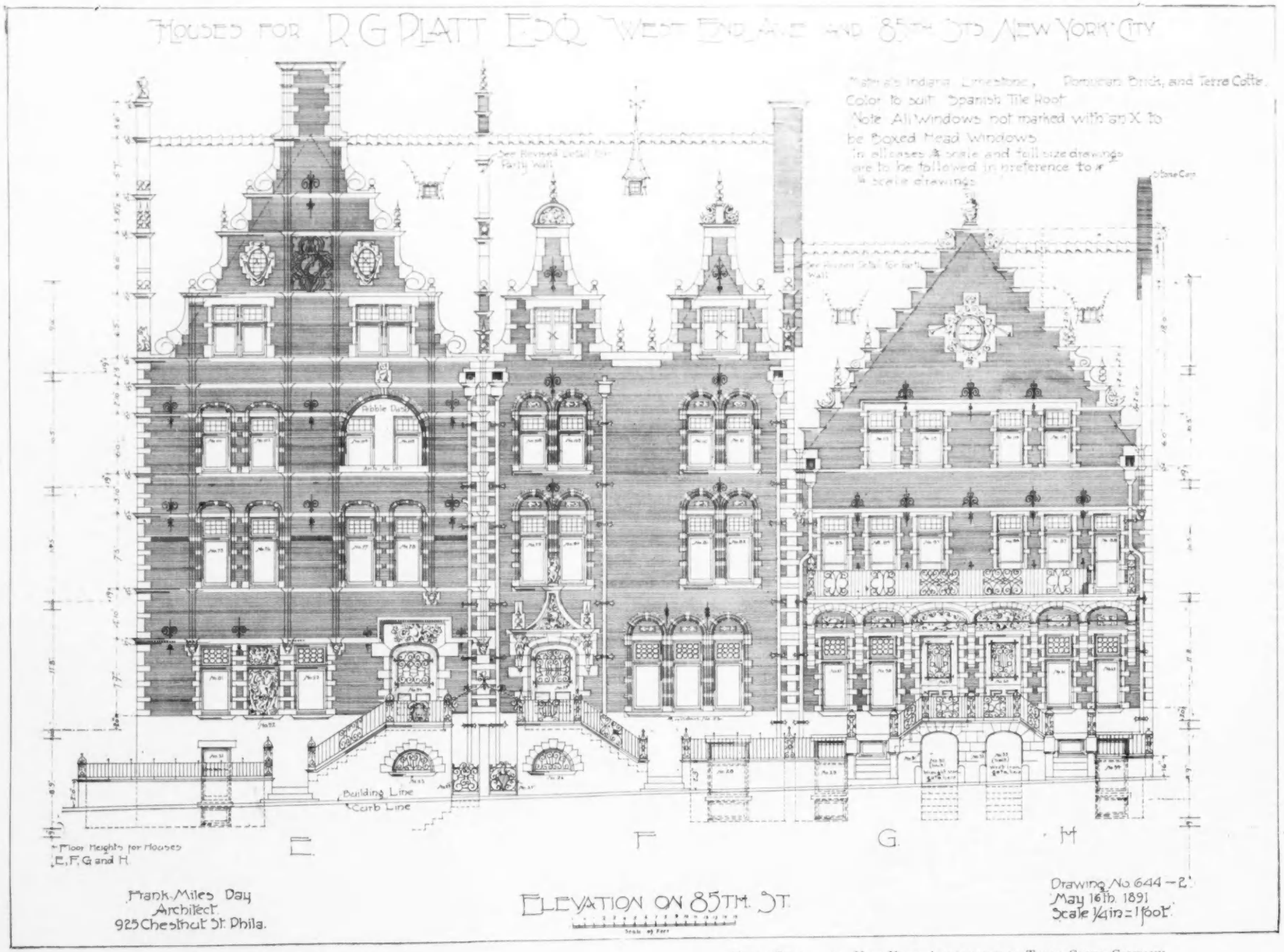
BRICK FROM MEEKER & CARTER, NEW YORK.

TERRA-COTTA FROM NEW YORK ARCHITECTURAL TERRA-COTTA COMPANY.



TERRA-COTTA FROM NEW YORK ARCHITECTURAL TERRA-COTTA COMPANY.

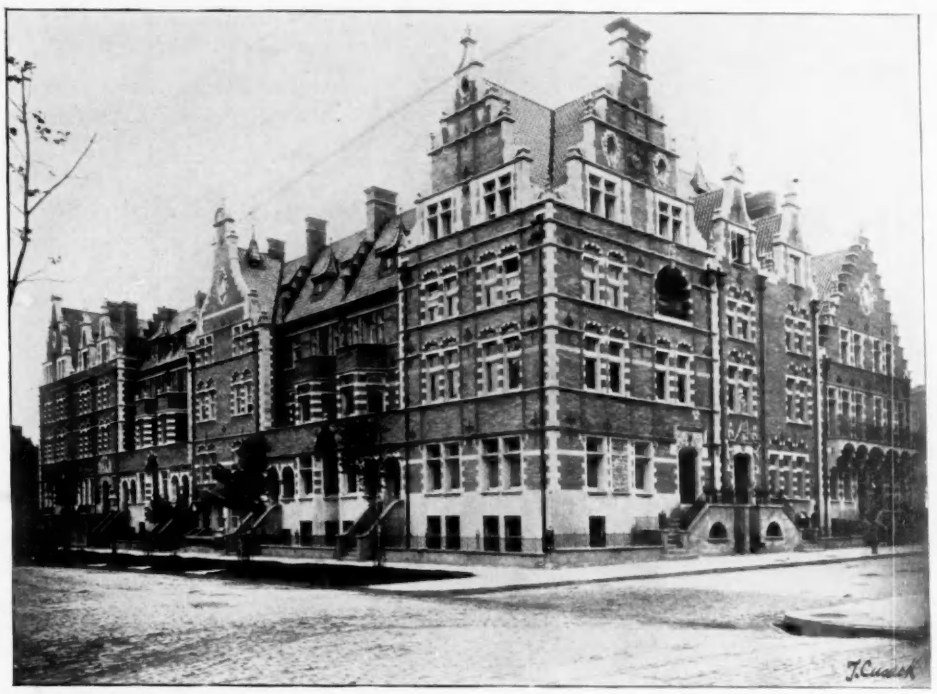
BRICK FROM MEEKER & CARTER, NEW YORK.



BRICK FROM MEEKER & CARTER, NEW YORK.

TERRA-COTTA FROM NEW YORK ARCHITECTURAL TERRA-COTTA COMPANY.

As a matter of fact, while the Fleshers' Hall, as it is sometimes called, is undoubtedly the inspiration of this West End Avenue church, there are too many points of difference to admit of any charge of plagiarism. In the first place, the requirements of plan have prevented Mr. Gibson from closely copying the Haarlem market, even had he wished to do so. The portion of the church upon the corner is the only part resembling the Dutch building, which is rectangular in plan, with three dormers almost equally spaced on the lateral façade. The nearest approach to the old building is the main entrance, which is an almost literal copy; but the large circular window is, it seems to us, out of scale, and this same fault appearing in the windows of the side elevation totally changes the character of the design. Although Mr. Gibson's detail is much less riotous, and in most instances far better than that on the old building, the general effect is not so quiet, owing to the more irregular arrangement, and the difference in scale. The church as a whole, however, is one of the most interesting and satisfactory examples of recent architecture in this city.



HOUSES FOR R. G. PLATT, NEW YORK. FRANK MILES DAY & BRO., ARCHITECTS, PHILADELPHIA.
Brick by Meeker & Carter. Terra-Cotta by New York Architectural Terra-Cotta Company.

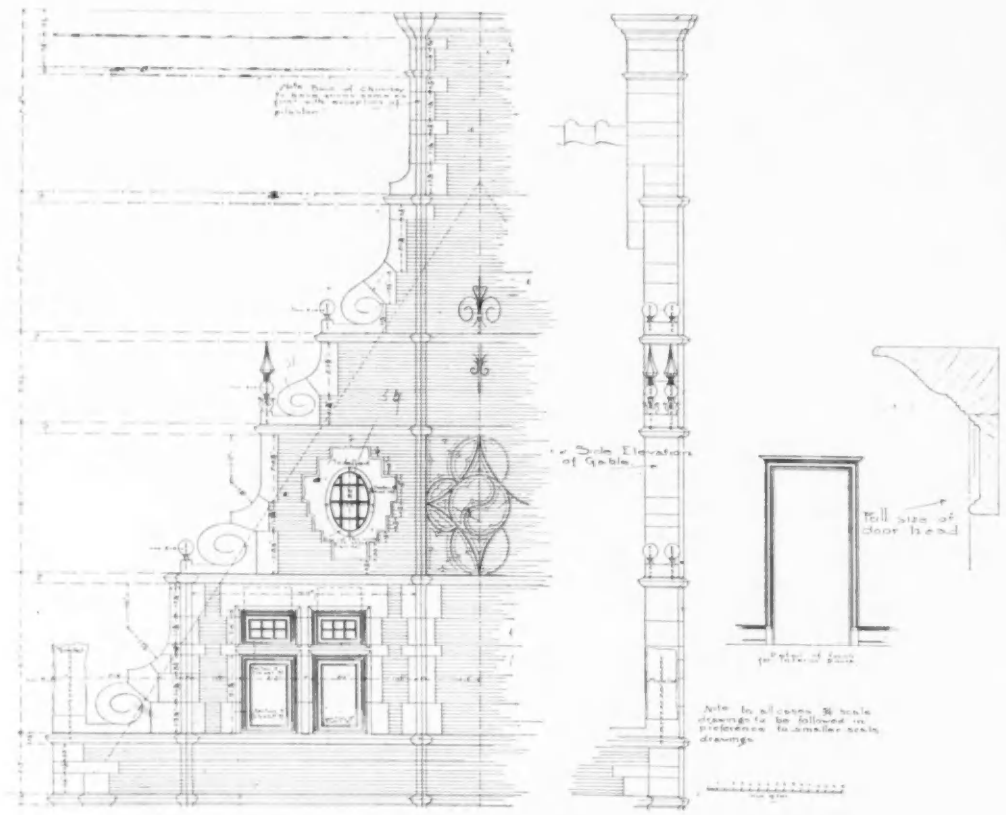
In the block of houses a little farther up West End Avenue, we have one of the best solutions possible of a block of dwellings, each with marked individuality, but a part of one harmonious whole. Some of the houses have high porches, others have low. Each is a composition in itself, and were these several houses scattered over New York, instead of built in one block, they would each be a noticeable example of city house architecture.

By their general character, and especially by the house on the corner of 85th Street, we are reminded of the town hall of Franeker, Holland. The drawings and details published in this number give a tolerably good idea of this work. The color is rather strong, a white terra-cotta being used, the brick being the same warm, speckled Roman brick used in the Collegiate Church. Some of the details of the terra-cotta are published also, from photographs loaned by the New York Architectural Terra-Cotta Company, who did all the terra-cotta work. An examination of this work shows the possibility of successfully using the architecture of the Netherlands as an inspiration for our own brick and terra-cotta work, and especially work of domestic character. It is picturesque enough to suit any one, it is logical, it is homelike in character, and it is essentially an architecture of clay materials.

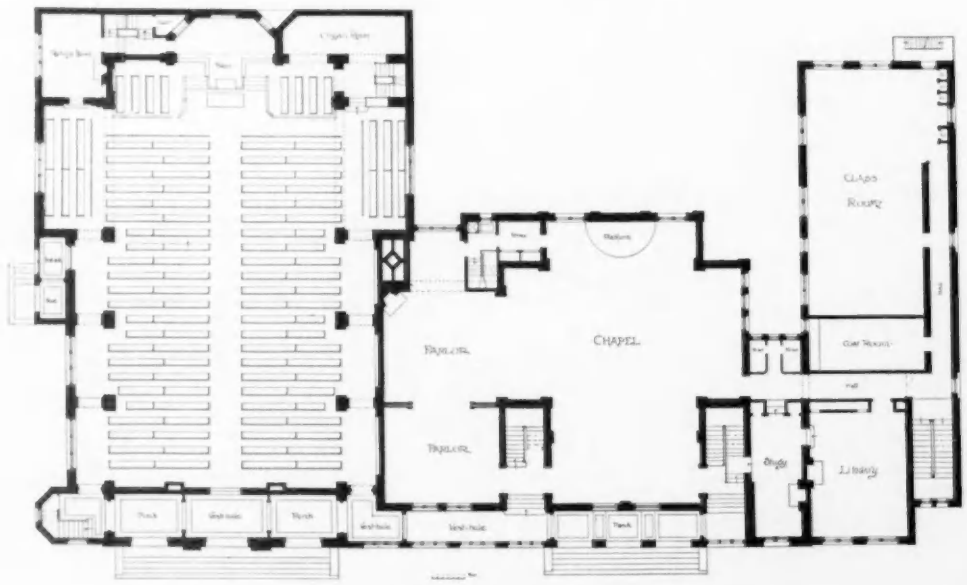
HOUSES FOR R. G. PLATT, NEW YORK. FRANK MILES DAY & BRO., ARCHITECTS, PHILADELPHIA.
Brick by Meeker & Carter. Terra-Cotta by New York Architectural Terra-Cotta Company.

Those readers of THE BRICKBUILDER who are particularly interested in this new Flemish work in New York will find an article entitled "The New 'New Amsterdam,'" in *Harper's Weekly* of April 21, this year. It is illustrated by a full page of photographs and drawings of the subjects published here, and several other buildings either projected or in process of construction.

They will find Henri Havard's book, "La Hollande au Vol. d'Oiseau," with its most charming drawings by Lalanne, an almost indispensable aid in studying old Flemish work..



DETAIL OF GABLE, HOUSES FOR R. G. PLATT, ESQ., NEW YORK.
F. M. Day & Bro., Architects, Philadelphia. See Preceding Page and Plates 44 to 48.



PLAN OF WEST END AVENUE COLLEGIATE CHURCH, NEW YORK.
R. W. Gibson, Architect, New York. See Page 106, and Plates 41, 42 and 43.

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

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No person, firm, or corporation, interested directly or indirectly in the production or sale of building materials of any sort, has any connections, editorial or proprietary, with this publication.

THE details of terra-cotta published on this page are taken from the houses for R. G. Platt, illustrated in our plates and the New York letter of this issue. They were executed by the New York Architectural Terra-Cotta Company, of 38 Park Row, New York. A reference to the elevations and photographs will serve to locate these details.

THERE is unquestionably a growing demand for white brick, or brick so nearly white that the effect of the finished building is white. The great difficulty experienced so far in the use of white brick is its tendency to turn green. This greening of bricks, however delightful may be its effect in some instances, is seldom desirable on work for which a white brick would be used. Many manufacturers have taken a hand in producing white brick, and gradually they come nearer and nearer the mark. Two of the latest ventures in this white brick field have so far been quite successful, and the tests the brick have been submitted to warrant editorial mention. The Eastern Hydraulic-Press Brick Company have put out a very handsome white brick

which Mr. Mack has been abusing for several months to the best of his ability. He has frozen and boiled it, time after time, subjected it to all varieties of weather, and it is still white. This he has done before placing the brick upon the market, to satisfy himself as far as possible that he had a good white brick. While this brick has not been out long enough to have the actual test of building, there is a fair probability of its satisfactorily standing such a test. The other brick referred to is made by the Powhattan Clay Manufacturing Company, near Richmond, Va. It is being used by Carrère & Hastings in the large Jefferson Hotel in that city, and so far shows no signs of greening. If there are instances of other white brick being successfully made, we would like to have them brought to our attention, as it is a matter in which architects are taking increased interest.

WE have had an inquiry from a subscriber, which is published in the manufacturers' department of this issue, and which brings up a subject upon which we want the opinion of our architectural readers. The correspondent inquires whether common brick are ever made Roman shape, and if so, with what success. We do not know of a single instance, yet we cannot see any reason why such a shape in good quality common brick should not become immediately popular with architects. Our purpose in repeating the question here is to call for expressions of opinion from architects. If THE BRICKBUILDER can be useful in any special way, it is in placing the consumer's wants before the producer. If architects want and will use a good quality common brick in Roman shape, let them write us, giving us such requirements as will guide the manufacturer in satisfactorily supplying this want. If there are any manufacturers making such brick, we would like to know where there are. Undoubtedly

the brick machinery manufacturers can inform us whether they have fitted any of their machines for producing common brick in Roman shape, and we would like light on the subject from them.

SUCCESS should attend the efforts of the manufacturer who enlists the ablest kind of professional service in the preparation of his stock designs. We cannot too highly commend such a course, and we feel fully justified in calling our readers' attention to the work Mr. J. A. Schweinfurth has been doing for Messrs. Fiske, Homes & Co. of Boston. Mr. Schweinfurth has designed a number of brick and terra-cotta mantels, which can be furnished glazed, if desired, but which are primarily intended to be made in quiet, almost neutral tones of dull-finish terra-cotta. This work is characterized by the finest modelling, rendering the mantels as suitable for interior finish as cut stone would be. The designs are made with a view to varying width in chimney-breasts, and are adjustable to such differences within certain limits. Many of them are illustrated by perspective drawings by Mr. Schweinfurth, similar to the plate on page 120 of this issue, and are reproduced in the new catalogue Fiske, Homes & Co. are now issuing. The mantels run in price all the way from $30 to $150, and scale diagrams for setting them are supplied so that they can be put in place by any skilful mason or tile setter. In securing the services of Mr. Schweinfurth, this firm made their longest step towards success, as without good designs the finest terra-cotta work is valueless.

THE attention of non-subscribers is especially called to the supplementary half-tone illustrations we begin publishing this issue with "Brick and Marble of the Middle Ages." These large plates, being full-size reproductions of the finest foreign photographs, could not be bought for the cost of the paper, let alone the cabinet size photographic reproductions which are also supplementary to this article. Clubs of draughtsmen are especially solicited. Our discounts for such clubs are very liberal.

BRICKBUILDER COMPETITION FOR A CITY HOUSE.

AWARD.

FIRST PRIZE, $100.
"Jerry." Louis Sonntag, Philadelphia.

SECOND PRIZE, $50.
Lion Rampant. James C. Green, St. Louis, Mo.

THIRD PRIZE, $25.
Cross in Circle. E. S. Wester, Boston, Mass.

FOURTH PRIZE. Book worth $15.
"Capital." Gilbert F. Crump, Rochester, N. Y.

FIFTH PRIZE. Book worth $10.
Wreath and Torch. Edwin R. Clark, Lowell, Mass.

SIXTH PRIZE. Book worth $5.
Brick and Terra-Cotta. J. Mills Platt, Rochester, N. Y.

SPECIAL MENTION.
"Hasty Pudding." Harvey T. Hauer, Philadelphia.
"Roccoco." Edward J. Willingale, New York.
"Civility." Herbert G. Paul, Toronto, Canada.
Double Cross. Charles R. Ten Eyck, Bayonne, N. J.

There were twenty-six designs sent in, the average of which, both in design and draughtsmanship, was very high. Mr. George H. Wetherell, of Winslow & Wetherell, and Messrs. Robert D. Andrews and Herbert Jaques, of Andrews, Jaques & Rantoul, acted as the jury of award. Their report, with some of the prize designs, will appear in the July number. The problem was one of the most difficult that could have been given out, and the number of creditable solutions received was a matter of surprise.

FIREPROOFING.

THE INSURANCE OF PUBLIC BUILDINGS.

WITHIN the last quarter of a century a change has been gradually taking place in the minds of American fire underwriters respecting the advantages of fireproof construction in buildings, and the responsibility that can be fairly thrown upon them to do what they can in thus improving the character of our building property. Before the time of the great fires in Chicago and Boston, the underwriters who were the recognized leaders in the fire insurance business were inclined to take the position that it was no concern of theirs to urge the advantages of fire-resisting construction; they were in business to insure against loss by fire, and to entreat the public to so put up their buildings that there would be little or no loss, was, in effect, for the insurance men to undermine their source of livelihood, by making insurance unnecessary. Insurance against fire was a species of speculation, and the greater the risk the larger would be the commissions of the "middle men," — the underwriters who collected the premiums from the general public to pay the losses of that section of the public who were unfortunate.

This method of regarding the question was seriously disturbed by the great conflagrations just referred to. These proved that faulty construction in a large city might easily lead to results which would bankrupt the insuring companies; and the ashes of the two great fires were hardly cold before the underwriters began to formulate methods of rating which would accord to those who were willing to put up a better class of building a decided discrimination in their rates of insurance.

But two decades ago the idea that mercantile, manufacturing, storage, or even office buildings would be put up in a thoroughly fire-resisting manner was hardly entertained. The schedules for rating buildings prepared by the Boston and New York Boards of Fire Underwriters were based upon the theory that it was impossible to expect the American property owner to build in this manner. The United States government might construct fireproof buildings, and some of the great life insurance companies might put up office structures of this character, but there the effort would end. The rating schedules issued from 1872 to 1880 were intended to classify and rate buildings which have been described as frame structures, surrounded on all four sides by brick, stone, and sometimes by iron walls. No effort was made to provide by rates of insurance for anything better than this, and it was even at that time held that it was hardly wise to encourage such construction, since the owner of such a building, or its occupants, would not consider that it was necessary to protect themselves from loss by insurance. Certain truths had at that time had their significance forced home upon the underwriters. One was that wooden mansard roofs were productive causes of an extension of a fire; another was that when exposed to great heat an eight-inch, or even a twelve-inch brick wall was an insufficient barrier; but that even a thin brick wall might be safer, under such conditions, than one built of granite. But these were all conflagration lessons, that had little bearing on the question of interior construction, which was not much better in our large cities from 1873 to 1880 than it had been from 1860 to 1873. In fact, up to twelve or fourteen years ago we had in all of our American cities buildings put up which for the combustible character of their interiors were as bad as any that had ever been built since the days of the Revolution; and these with the tacit approval of the fire underwriters.

In the interval referred to a decided change for the better has taken place. This was partly brought about by the success met with by the "mill mutual" insurance companies, in what is known as mill constructed buildings, a method which was about ten years ago first introduced into the construction of the modern city warehouse. From the theory of having each floor cut off completely from other floors, it is only a step to the demand that the interior division walls, the floors themselves, and, in fact, all of the interior except the inner finish, shall be made of incombustible materials. The growth toward this demand has been slow, but it has been progressive and hence healthy. The underwriters have not been far in advance of public opinion — not so far, possibly, as they should have been; but they have been in advance, and are now doing all that they can to induce, by the advantages they offer in the way of rates of insurance premium, the owners of real estate to put up fireproof buildings, and the manufacturers and merchants to occupy these.

The practical question is, What are these inducements, and are they sufficient to lead to the construction of the fireproof type of building? I can answer this only by stating what they are and leaving it for those interested as owners and occupants of buildings to decide whether or not they are sufficient.

In the first place, it is well to point out that there was never a time in the commercial history of this country when it was so difficult for those owning property or doing business in the centres of our large cities to obtain the insurance protection which they require for safety, and for the maintenance of their business credit as merchants. The number of fires in our large cities tends constantly to increase, which causes the managers of insurance companies, looking back on the numerous corporate wrecks of the past, to cut down their lines (that is, the amount that they will insure on any one risk) to exceedingly small dimensions. Now this comes at a time when the requirements of business compel dealers to carry large stocks of goods, and to occupy large stores. The result is that many of our merchants are running risks in the way of possible loss by fire which they do not like to think of, but which make them seriously alarmed when any fire occurs in the vicinity of their stores. Others of their number are ransacking the world for insurance protection, and failing to find enough of this in China, Australia, and elsewhere, are trusting to the questionable guarantees of Lloyd and mutual associations which have been recently started in this country. Now, if these merchants occupied buildings which were recognized as distinctly fireproof,— that is, buildings in which wood and other combustible substances were only used for mere purposes of finish,— there is little doubt that companies which limit their lines to say $10,000 on a risk will quickly increase it to $25,000 or $30,000. In a word, the possibilities of obtaining insurance would be increased from one hundred to two hundred per cent. To the owner of a building this would sometimes mean the difference between having a tenant and not having one. The same foreign companies which limit their lines to say $10,000 on a large departmental store in an American city, will write the equivalent of $100,000 on the Louvre or Bon Marché in Paris, because they know that these two establishments are carried on in strictly fireproof buildings.

And then comes the matter of rate of premium. If I am not mistaken, the rate on the Bon Marché, in Paris, has varied in recent years from one quarter to three eighths of one per cent per annum, or about one fifth of the rate paid for insurance by such establishments as Jordan, Marsh & Co. in Boston, Macey & Co. in New York, or Wanamaker & Co. in Philadelphia. In other words, for $1,000,000 insurance, the proprietors of the Bon Marché would pay about $2,500, while the similar American establishments would pay for the same volume of insurance protection from $12,500 to $15,000. The difference in this case is chiefly in the matter of building construction. The conditions of the business are substantially alike, while the fire department of Paris can hardly be said to equal in efficiency those of our large American cities. In the opinion of the fire underwriters who insure both the Paris risks and similar risks here, there is a difference in safety in favor of the former equal to the interest that would be earned on several hundreds of thousands of dollars, or more than enough to pay for the difference in building fireproof buildings for these great American stores.

Take a comparison in building in this country. By the schedules for rating, adopted by the underwriters, a strictly fireproof building rates, on the average, at not more than half the rate asked for insuring the best building of ordinary construction, and this holds much the same with the contents of these. We are prepared in the Boston Board of Fire Underwriters to give approximate rates upon building plans, when the future occupancy can be definitely determined.

A number of plans have been recently worked out; it has been found that the saving in the cost of insurance was more than sufficient to pay a fair rate of interest on the increased cost of fireproof construction over ordinary construction.

The underwriters now realize that, if their business is ever to be brought up to a scientific basis, it must be by preventing conflagrations, which are, to their experiences, what a world wide plague would be to the actuary's tables of a life insurance company. Conflagrations can only be prevented by fireproof construction, and hence the insurance companies are now willing to grant for this class of work a far greater and fuller consideration than they have ever been before.

OSBORNE HOWES.

A FIREPROOF DOOR.

WE are in receipt of a description of a fireproof door invented by Mr. C. E. Richardson of Minneapolis, and manufactured by the Fireproof Door Company, 305 Boston Block, in that city. It consists of a door shape, pressed out of steel, into any desired size or pattern, and fitted over a simple wooden frame. The inside is filled with mineral wool, which the makers claim takes away all metal sound. The casings are covered the same as the door, the manufacturers furnishing both, as well as the necessary hardware. The metal can be finished in any one of the many processes of plating. They are claimed not to sag, swell, shrink, or warp, and are about one third lighter than hardwood doors, while their cost is about the same.

FIREPROOF BUILDINGS.

A WRITER in the New York *Recorder*, commenting on the destruction by fire of the Rev. Dr. Talmage's Tabernacle, in Brooklyn, adds: —

What is fireproof?

Iron isn't, because it melts in fierce heat, and in less heat expands. Thus an iron beam between two walls may expand so much as to throw one of them down. Stone isn't, because in fierce heat it crumbles away to dust. The material which is most nearly fireproof is good brick. The more it's baked, the harder it gets. So the best fireproof buildings have brick terra-cotta walls, floors of hollow brick, and doors and casings only of wood. Even then a fireproof building will burn if a very hot fire attacks it from the outside. But a fire starting in one of the rooms only burns up what's in that room and stops. It never gets very hot.

In such a fire as that in Chicago or Boston, the best of buildings would be damaged greatly, even if they did not fall.

Wood, when it is thin, burns very rapidly, but in big beams it doesn't catch fire so readily.

So in ordinary wooden buildings, it is the hollow spaces between the lath and the walls and floors that carry the fire out of sight like so many chimneys until it is ready to burst through. These hollow floors are one of the greatest dangers in fire. The stairway, with its wooden stairs, and the elevator shaft, if there is one, are the points of greatest danger, because they draw the fire up like chimneys.

THE Germania Building illustrated above is one of the important office buildings of New York City. It was designed by Messrs. Lamb & Rich of 265 Broadway, who have done some of the best business blocks in New York. The Lorillard Brick Works Company, of 92 Liberty Street, New York, furnished the hollow fireproofing material used to render this structure absolutely fireproof.

LIMES AND CEMENTS,

MORTARS AND MORTAR COLORS.

MACHINE-MADE LIME MORTAR FOR BRICKLAYING AND PLASTERING.

CONSIDERING the great number of improvements that have been made in recent years, in manufacturing and supplying the various materials entering into the construction of buildings, improving the quality of the same, reducing the cost and greatly facilitating the completion of the buildings, it is a very remarkable fact that no improvement has been made, until recently, in the method of making lime mortar, one of the most important materials entering into the construction of buildings. It is still universally made in the most crude, inconvenient, and unreliable manner,—made with a hoe by hand on the streets.

The manufacture of lime mortar, for both bricklaying and plastering, by machinery, and its delivery at the building in cart loads in a *wet* and *plastic* condition, with the goat hair, or any of the various fibres, and fresh water incorporated with the lime and sand, ready for use, without the addition of any other material or further manipulation whatever, excepting occasionally a little water for retempering, as now done in New York City, Brooklyn, and Jersey City by the United States Mortar Supply Company of No. 289 4th Avenue, New York City, is one of the marked improvement that have been made in connection with building operations in recent years.

Realizing the necessity of a more convenient, reliable, satisfactory, and economical plastering material than could be obtained in the New York market, a number of the most prominent building contractors and plasterers of New York City and Brooklyn formed the above company to supply the building trade of that section with machine-made lime mortar as the best, most convenient, economical, and healthful plastering material, and the best and cheapest lime mortar for bricklaying. The idea of manufacturing lime mortar by machinery and its delivery at the building, ready for use, was introduced in New York City by Mr. W. W. Kenly, member of the American Society of Civil Engineers, the present general manager of the company. The works of the company were, also, designed and erected by him. Since its introduction in New York City, in September, 1893, it has been used for plastering nearly all the important and costly buildings recently completed, all noted examples of the very best modern practice, both in construction and the materials used, such as the Manhattan Life Insurance Company's Building, 68 and 70 Broadway; the Home Life Insurance Company's Building, Broadway, near Murray Street; the Bowery Savings Bank, Corn Exchange Bank, "Life" Building, and many others, and it has also been adopted for plastering the new St. Luke's Hospital. After a thorough trial it has been specified by many of the leading architects for a large number of important and costly buildings recently let to contract, and for many others for which plans are now in preparation. Machine-made lime mortar is not a new "patent plaster," but the old, well-known, and thoroughly tested lime mortar, made by machinery by practical and experienced men, in a scientific and systematic method, instead of the present crude, inconvenient, and unreliable manner by hand with a hoe. It *positively* contains no material not used in lime mortar made by hand.

The value and merits of good lime mortar as a plastering material have been proven and established by its successful and continued use for centuries. It is the *only* plastering material whose value and merits have been established by the test of long experience. It is the most healthful of all plastering materials and is thus a most valuable sanitary agent; lime being most commonly and generally used as a disinfectant and purifier of unhealthful places, and when used as a plastering material it is an ever-present, silent but active sanitary agent, continually giving forth its health-preserving properties. This especial and valuable property possessed by lime mortar only is recognized and endorsed by architects, the medical profession, and sanitary engineers. It is worthy of note that the Post-Graduate Hospital, Seton Hospital, New York Hospital, House of Relief, and the Eye and Ear Infirmary, all recently completed in New York City, were plastered with machine-made lime mortar, and it has been adopted for plastering the new St. Luke's Hospital.

Although lime mortar possesses so many valuable properties as a plastering material, there are many and serious objections to its use as made by hand. It is inconvenient, more or less unreliable in quality, taking up more room around the building than all the other building operations combined, costs more when made in the cellars, thereby delaying the completion of the building. The hair, being generally put into the lime paste when it is hot, is burned out, causing the ceilings to fall, and, being very frequently used in a short time after it is made, it "pops" or "blisters," damaging the decorations and causing great subsequent annoyance and expense. All the objections that have been made in recent years against the use of lime mortar have been based on the argument: Not that good lime mortar is not a good and satisfactory plastering material, but that it is only *half made* by hand. The value and merits of good lime mortar are too well known and

established to need any special or further arguments in its favor in this article, and machine-made lime mortar, whilst possessing all the valuable properties of hand-made lime mortar as a bricklaying and plastering material, removes all the objections to the use of lime mortar as made by hand, and possesses many additional advantages, especially as a plastering material.

One of the especial and valuable advantages of machine-made lime mortar is that its use advances the completion of large and costly buildings in the crowded sections of large cities, as proven by its use in plastering the Corn Exchange Bank, corner of Beaver and Williams Streets, New York City; the completion of this building having been advanced from four to five weeks owing to the cellar space not being necessarily occupied in making and storing the mortar, which would have delayed the plumbing installation of the steam and electric plants, etc. This advantage was also proven by its use for plastering the Home Life Insurance Company's Building, where machine-made lime mortar was substituted for a well-known "patent plaster," because of its superior qualities, greater economy, and from the valuable fact that this important and costly building could be completed in less time by the use of machine-made mortar.

The Manhattan Life Insurance Company's Building, New York City, is also a well-established example of its advantages in advancing the completion of costly buildings, thus saving additional interest on the cost of the building, and giving earlier occupancy and consequently earlier revenue from rentals. Some of the additional advantages of machine-made lime mortar may be especially mentioned as follows: —

1. It is guaranteed not to "pop" or "blister," one of the serious objections to hand-made mortar.

2. It will not stain or discolor the walls and decorations, nor rust or corrode metallic substances, as various other plastering materials do, as it is a well-established fact that lime preserves metallic substances.

3. The above advantages, combined with its uniform color, adapts it especially for use in plastering churches, public halls, theatres, etc., where decorations are applied on the rough finish.

4. It saves extra expense when mortar has to be made in the cellars of buildings.

5. It saves space around the building, giving more room for the other building operations.

6. Being always correctly proportioned and thoroughly mixed, it is more uniform in quality, of greater adhesive strength, making a harder wall; and its smoothness enables it to be applied more rapidly.

7. Being delivered on order, ready for use, it is especially convenient and economical for *alteration* and *repair* work.

8. Its use is an assurance to owners and architects that requirements of their specifications are complied with, and relieves them of any anxiety and apprehension on account of the use of half-made and inferior mortar.

9. It is better, cheaper, more convenient and economical than hand-made mortar, or patent plasters, and its many superior qualities and advantages make it the perfection of plastering material.

Its advantages as a bricklaying mortar are owing to its freedom from coarse gravel and lumps of unslaked lime, so common in the hand-made mortar, saving waste, both of mortar and time, caused by removing same from under the bricks when set; and its smoothness enables the bricklayer and mason to perform his work with more

ease, comfort, and dispatch; and its greater adhesiveness, due to the thorough mixing, makes a stronger bond. Owing to its uniform quality and smoothness, cement can be more thoroughly and easily mixed with it than with the hand-made mortar.

All practical men connected with building operations will readily appreciate these many advantages of machine-made lime mortar, and its general use in all large cities is merely a matter of a few years, as practical business men will quickly avail themselves of so great an improvement over the present method.

CEMENT IN CONCRETE CONSTRUCTION.

THERE is a growing consumption of the best brands of cement in improved concrete construction, which has been used in California with great success, starting, we believe, from the office of Percy & Hamilton, architects of San Francisco, who have applied the Ransome system to several large and important structures. This form of construction has spread eastward by the organization of companies to apply it in several large cities.

The Aberthaw Construction Company, Boston, tell us that they are meeting with great success in this concrete construction. It is a method of erecting ordinary buildings with concrete as a substitute for more expensive material. The advantages of concrete for foundations, and all masonry work under water, or under ground, are recognized by every one; also its adaptability for basement floors, sidewalks, and other positions where surface wear and compression are the principal forces to be resisted. For walls and partitions floors, roofs of buildings, its adaptability has not been so apparent, or its application as successful as might be desired. On account of the small and very uncertain tensile strength of ordinary concrete, it has appeared to be entirely unadapted for horizontal beams or floors, or any parts of a structure subject to other than a compressive force. Many attempts have been made in the past to unite the tensile strength of iron with the compressive strength of concrete in such a manner as to secure full value for each material for its respective position. The methods were more or less complicated, and from a question of relative cost not feasible, there being great waste of the more expensive material. Mr. E. L. Ransome, however, working on this idea of combination, invented and applied plain, square, cold-twisted iron bars for this work, and the result demonstrated the practicability of the

idea, it showing by test that the combination had a much greater advantage than the original tensile strength of iron. Hundreds of tests have since been made by various experts, with the uniform result that the cold twisting of plain iron bars increased their tensile strength from ten to twenty per cent.

Some of the buildings which have been erected by this method are the California Academy of Science, the Leland Stanford, Jr., Museum, Torpedo Station on Goat Island, Borax Works, Alameda.

The Aberthaw Construction Company publish a very interesting catalogue, giving detail of construction, which is well worth reading, and which they will be pleased to send to any address.

THE BOILING TEST FOR CEMENTS.

THE stress laid by some manufacturers of cement upon the importance of the boiling test has led others to deny the usefulness of this test. From the opinions cited by the parties on both sides, there is evidently a difference of opinion among engineers and architects. As every test is important which is of real value in determining the character of cement, we have called upon a number of acknowledged authorities for their opinion as to just what the boiling test demonstrates, and how it should be conducted. As it is impossible to make a special request upon everybody who is in a position to contribute information on this subject, we herewith invite architects and engineers, who have given the matter consideration, to add their remarks, that we may thereby gain a consensus of opinion.

MORTAR COLORS FOR WHITE BRICK.

SOME of the very best effects we have seen in the laying of white brick are secured by a use of a gray mortar color, producing a mortar slightly darker than the brick. If the effect is too cold, however, a mortar colored light buff will do wonders in warming the surface. Care should be taken not to get too strong a buff, as it will materially change the effect, to secure which the white brick were used.

ARCHITECTS AND CEMENT SPECIFICATIONS.

IN all good brickwork, especially exteriors, the best kind of cement mortar should always be used. Judging from the report of various manufacturers, architects are apt to be very slack in the matter, not only of specifying but of testing the cement to be used. Every precaution is necessary in the erection of a modern fireproof building with all its hollow tile work to be set around the steel frame. When certain manufacturers have labored conscientiously to produce a cement of the very best quality, and architects are convinced of this, it seems not only unjust to the manufacturer but stupid in the architect to draw cement specifications so loose that the contractor can, as he usually does, run in a cheaper and weaker brand.

THE MANUFACTURER.

A Department devoted to the Market Side of Clay Production.

BRICK, AND THE COMING MODEL CITY.

SERIATELY TREATED AND CONSIDERED.

By J. W. Crary, Sr.

I WILL take the risk of being called visionary when I say that the twentieth century will not close without seeing most of our cities with streets 180 feet wide. There will be 10 feet on each side for sidewalks; that will leave 160 feet for streets and park. The centre will be a park 60 feet wide. This will be divided into three equal parts; the centre will be paved in "mosaic." On either side there will be a park, with a suitable row of trees in the centre of it. These parks will be protected by a substantial iron fence, set in terra-cotta. The promenade between the parks will have proper, convenient gates. The side streets will be paved with brick, and the sidewalks will be paved with tile, of suitable color and make.

A terra-cotta sewer pipe of sufficient size will be laid in the streets, so that the drainage will be perfect from streets and back-yards. At suitable elevated points along the streets there will be smokestacks, that will be kept heated by proper means, and will be connected with the sewers in the streets.

The smokestacks will draw up and destroy all the poisonous gases that are generated in the sewers. All garbage, or filth in streets, will be carefully removed every day, and by the best means disinfected. Privies will be so constructed that, instead of passing excremental matter into sewers, it will be carried out every week to some proper place, and there disinfected, and manufactured into valuable fertilizer.

WATER SUPPLY FOR COOKING AND DRINKING IN BRICK CISTERNS.

On every lot that is improved by buildings, dwellings, or otherwise, there will be cisterns, built of brick and cement.

In cities where there is much frost, the cisterns will be built underground. In cities where there is little frost, cisterns may be built on the surface. When built underground, they will be "egg-shaped," vertical section. It will be seen that the underground cistern can be built anywhere where the excavation can be done. It can be built of brick, four-inch wall, if the diameter is not over ten feet. Over that, the wall should be two brick (wide) thick. The brick should be hard, well burned, and perfectly wet when laid. The mortar should be composed of best hydraulic cement and sharp, clean sand, in proportions to "*set*" *hard*, and all the joints should be perfectly "*flushed*" with the mortar. To cement the inside, cement and clean sand of equal proportions should be used. The workman should commence at the top; he should wet the brick before putting on cement, and the cement should be put on at least a quarter inch thick, and after it sets a little it should be brushed with thick *wash* of pure cement. In building an underground cistern, great care should be taken to thoroughly pack the earth all round the outside of wall. The crown arch may be built without a "*centre*." A real true expert bricklayer can start the *crown* from the "*skewback*," and when it is above ground he can get out and stand on the arch as he lays the brick. One course is laid all round, and when closed by the "key brick" it cannot fall. The reason of it is plain to the scientific eye. I have thus crowned over a cistern sixteen feet in diameter, standing and working on top.

MY FIRST EXPERIMENTS IN BUILDING SURFACE CISTERNS

were in New Orleans. It is quite difficult to find ground in New Orleans where a cistern can be built to any proper depth, and when a large cistern is needed it must be built above ground; so that few brick cisterns were built, the wooden "tank" being in general use. Brick cisterns built round, and on the surface, had been failures, and I started the building of concave outside cisterns. They were a noted success. I built them ten to fourteen feet high; and some that held one thousand barrels of water. If built right, they are cheap and ornamental. It is a fact not generally known that the larger portion of cooking and drinking water in Louisiana and the southern part of Mississippi is rain water caught in cisterns; most of them are brick, where the ground is suitable, and brick can be had. One large cistern is built which is filled during the winter rains; then one or more other cisterns are built that are supplied by rains of all seasons. The one filled by winter rains is cut off from rain water, only in the winter season; so that the water becomes perfectly pure and tasteless. So it would be best everywhere to have at least two good brick cisterns. There is scarcely a place in the United States where the rainfall is not sufficient to supply the inhabitants, if it were properly caught and carefully used.

THE BUILDING OF HOUSES IN THE FUTURE MODEL CITY.

As I have said in previous writing, health, morals, and social advancement, to a high and respectable position, require that each family shall live in separate houses. No family should have less than a *four-roomed house*. These houses will be built in pairs, two stories high, or in solid rows, with a solid dividing "party wall," along which there will be a "hallway" from front to back yard. A narrow stairway will lead from the hall to second story. There will be two rooms and a small kitchen back, on first floor, and two rooms on second floor. A six-roomed house may be built on this plan, by having a one-story back building; or an eight or nine roomed house may be built on the same plan carried three stories high, or a ten or twelve roomed house four stories high. The roof will be covered with tile, and a skylight made to light the hall, and give easy access to the roof. In cold-winter climates there will be a cellar in each house. All these constructions will not differ much from the common plan of building now in the city of Philadelphia. The distinctive difference will be in building better and stronger brick walls; in covering the roofs with tile; in making door and window frames and casings of

terra-cotta; in making all outside door and window shutters of fireproof material, and the same for floors, "washboards," etc., so that all buildings will be absolutely fireproof.

BRICKS AND TERRA-COTTA WILL BE USED WHEREVER PRACTICABLE.

Stone, even for cellars, is not so good or reliable as brick. The common way of building cellar walls with rough, unshapen stone, only partly headed in mortar, and often without "bond," affords no security for the brick walls built upon them. Hard, strong brick are much cheaper and better than stone, for all building purposes. A perfect "bond" can always be made with brick, but unless stone is cut, and properly shaped to make a "bond," it is impracticable to make it; and if made by cut stone, it is too expensive, even for fronts. Bricks and terra-cotta are by far the best materials for all building purposes, and decidedly the cheapest and most durable. All brick walls that require lateral strength should have pilasters; this saves brick: and a thirteen-inch wall, with a pilaster every eight feet, projecting four inches, with eight and a half inch face, is as strong laterally as if it were an eighteen-inch solid wall. For all cellar walls, "party walls," fences, and windows and doors, brick and space can be saved by pilasters, with the addition of architectural symmetry and beauty.

IT WILL BE ASKED, WHEN WILL THESE IMPROVEMENTS BEGIN?

I will say that the changes I have suggested are already being discussed by civil engineers, architects, and sanitary authorities. Narrow streets and costly grounds have made a craze for high buildings and tenement houses. Architects have been called on to make the most of a small parcel of ground, and, instead of studying health conditions, they have taxed their brains to pile up all kinds of building material "sky-high," with a mixture of ornate finish. Our cities are full of these pestiferous ornaments, "tenement houses," and "flats," and the death rate is steadily increasing, while social evils are fearfully augmenting.

IT WILL NOT BE LONG BEFORE THE GENERAL PUBLIC WILL DEMAND A CHANGE.

Capitalists, architects, and brick and terra-cotta manufacturers, will see their great opportunity to inaugurate the idea of building cities consistent with modern improvement and progress. They will either locate and place new cities, or extend and improve the suburbs of the old ones. A new field would thus be opened for capital, science, and skill, and soon the old cities would only be used for commercial purposes. This is a subject especially important to clay workers and architects. No stone, iron, or wood should be used for walls, except where absolutely necessary. Very light galvanized steel girders could be used instead of joists; they would be filled in between with light, hollow brick arches, and thus a building could be put up, floored, ceiled, and roofed with tile, that would be indestructible by fire; and the gain in insurance in five years would pay all the difference in cost above the common building. I will in my next paper say more on this point, and show a diagram of wall and girders of a house. All brickmakers are deeply interested in this subject, and they should help THE BRICKBUILDER to advocate and show the importance of brick building.

WASHINGTON MANUFACTURERS PROTEST.

THE character of Washington City, the capital of the United States, as far as its buildings are concerned, is essentially a brick-built city, and all the latest improvements in building operation are admirable illustrations of the possibilities in the brickmaking art, and stand for some of the best achievements in brick architecture. The white stone buildings, of which the city has a large number, have been looked upon as free from rivalry until the private residence of Mr. Leiter, on Dupont's Circle, began to take its complete form. It is of white brick, and is by all odds the most striking private residence in the city.

The extension of the fire limits about a year ago has had a decided tendency to encourage the brickmaking industry, for within the fire limits all buildings must be of fireproof materials, and brick, being the best all-round material, gets the advantage.

The greatest industry in the District of Columbia is brickmaking, and those engaged in this industry are thoroughly organized under the Brick Exchange. This organization has a membership of individuals, firms, and corporations representing several million dollars of capital employed in the manufacture of brick.

The members of the Brick Exchange have recently stepped into the field to fight legislation, and their antagonism to a bill now before Congress is somewhat significant. The bill over which the fight is taking place is one in which it is proposed to appropriate $4,350,000 to give Washington a perfect sewerage system. This bill is an outgrowth of a commission appointed by President Harrison in 1890. By this commission a report was sent to Congress in July, 1890, giving the above amount as an estimate for the proposed work, and provided that vitrified pipe would be used in all sewers of twenty-four inches in diameter, or less, properly laid in concrete; the larger sewers, the inverts to be made of concrete, brick, or stone, and the arches of brick.

The present protest from the Brick Exchange was brought out by the proposition of Capt. Derby, of the Engineering Department, in which he proposed to experiment relative to ascertaining if concrete could not be substituted for brick in the inverts and arches. The attitude of the brick manufacturers can be better explained in their own words. Mr. Holbrook, in an interview on the subject, said: —

"We do not object to the proposed issue of bonds for the construction of these sewers. What we most emphatically object to is experiments. This district has already suffered too much by experiments that have caused taxpayers hundreds of thousands of dollars. In the first place, our government is experimental. We are disfranchised. Then they built a water tunnel that was a failure, and tried experiments with block pavements. Decidedly we have had enough of experiments.

"That is our position, independent of our business as brick manufacturers. Now we, as the men who make bricks, know the history of the brick and its staying qualities. Is is a matter of history that bricks have stood the test of time. Concrete has not. Therefore it is to our interest to see that bricks are adhered to in this work.

"I am willing to admit that experiments are all right, but for a time, at least, we want to see them conducted at some one else's expense. That is the reason that we are combating the proposed trial of concrete, and strenuously urging that solid, substantial brick be used, material that is not a new venture, and which can be relied upon."

Mr. William H. West, president of the Exchange, stated that the Exchange was unanimous in declaring against any more experiments by the government engineers. He said: —

"The commissioners seem wedded to this process of experimentation as proposed by Capt. Derby. I can readily see how army officers are continually anxious to find some new plan for carrying out their plans as engineers. Many times they fail, and seldom they succeed. In case of failure they are removed to some other district until the taxpayers, who have stood the cost of their folly, have recovered from the breeze when the truth is known.

"I feel that it is going to be hard work to convince the commissioners of the truth of our claims, but when we go before the District Committee of the House, I think we can show them the utter folly of trying any further experiments, and prevent Capt. Derby and his coengineers in their costly schemes."

Other members of the Exchange spoke in like manner, and the unanimous opinion of the brick manufacturers is that they will be able to defeat the plan of the District Commissioners.

The sentiment as expressed in the papers of the city is that if experiments are to be made the commissioners should have them done elsewhere, as the District has suffered too much from experiments, and there is no question that brick and stone are the most enduring materials for work of this character. Doubtful substitutes are not to be entertained.

BRICK AND TERRA-COTTA MANTEL.

DESIGNED BY J. A. SCHWEINFURTH, FOR FISKE, HOMES & CO., BOSTON.

THE MANUFACTURER AS AGENT.

IT occurs to us that the manufacturers, especially in the smaller cities, who make only common brick, could, without much trouble to themselves, act as agents for the manufacturers of fine ornamental brick and terra-cotta. It goes without saying that the clayworkers of this country owe it to themselves and to their brother-clayworkers to advance in every way possible the general use of clay materials. The established manufacturer of common building brick, who is likely to be an influential business man in the community, owes it to his trade to work for the introduction of brick pavements, even though he may never himself manufacture these. The satisfactory use of brick for paving benefits the whole clayworking fraternity, if only from the increased importance it gives to clayworking from the additional capital it brings into the trade. Likewise, but more directly, the manufacturer who furnishes brick for a building owes it to the manufacturers of terra-cotta to work for the use of this material for ornamental work in place of stone or the still worse material, sheet metal; he should use his influence to substitute tile for slate or other less durable roofing materials. It is a strong pull all together that we want, and the manufacturers of common brick, who are in the majority, can help themselves and their fellow-manufacturers, who have large sums invested in the production of more careful and costly lines of goods.

Let us illustrate by a specific example. On this page we publish a design for a brick and terra-cotta mantel. It is only one out of a large number made by this single firm, which is only one of several that are working on similar lines. The amount of capital represented in this small line of goods, before the first ounce of clay is taken from the bins for manufacturing, is larger than the average brickmaker's yearly profit. The services of an architect of the highest professional standing have been enlisted in the preparation of the designs, sketches, and actual working drawings. Such services are most expensive. To get these designs reproduced and made into catalogues is another large item of expense. All this is preparatory. Before such work is ready for the market and wholly satisfactory to the designer and the manufacturer, much experimental manufacturing must be done. When these mantels are at last ready their handsome appearance makes them a credit, not only to the firm making them, but to the present advanced state of the clayworking industry. Why should not other clayworkers strive to have them adopted in place of wood or slate mantels? The manufacturers would undoubtedly allow a commission on all orders sent them by the trade, and every manufacturer could well afford to have a sample mantel erected in his office, from which to secure orders. But the argument does not apply alone to those particular mantels. It applies to all terra-cotta and glazed brick work, all roofing, flooring, and wall tiles. In the pages of THE BRICKBUILDER manufacturers will constantly find photographs of terra-cotta details of the best type from the best manufacturers. These will often be suggestive of details applicable to work you are supplying brick for, and, by properly bringing them to the attention of the architect, correspondence may be started which will lead to the use of terra-cotta. There are few instances where the terra-cotta company would not make it an object for you to continue such work. It benefits you every time you secure such a use of clay materials, not only by the amount of your commission, but by the extra boost you give clayworking in general.

WHO MAKES ROMAN-SHAPE COMMON BRICK?

AN INQUIRY FOR MANUFACTURERS TO ANSWER.

THE EDITOR OF THE BRICKBUILDER.

Sir, — I write to inquire if common stock brick have been made Roman shape, 1½ x 4 x 12 inches, and with what success. I think it would make a very desirable brick. Allow me to say I am well pleased with THE BRICKBUILDER.

Respectfully,

FRED W. WEITZ,
Contractor.

Des Moines, Ia.

[We do not know of any manufacturer of common brick making this shape. As it is something for which we think there would be a large market, and as architects would undoubtedly avail themselves of it, for use as a front brick where rough texture is desired, we will take pleasure in publishing a list of manufacturers who can supply such brick. We respectfully solicit correspondence relating to this subject from both manufacturers and consumers.— EDITOR.]

Yard Equipment.

THERE is no evidence of "dull times" in the finely equipped plant of Chisholm, Boyd & White, Chicago. We learned, on the contrary, that they had plenty of work on hand in filling present orders, and had several contracts ahead. The season has been a good one for them, and we congratulate them on their success, which, by the by, is not earned by halfway measures, but by energetic business enterprise.

"WORDS of cheer are ever welcome," and we quote the following letter from a well-known concern: —

"The April issue of THE BRICKBUILDER at hand, and must congratulate you on its fine appearance. It is decidedly *fin de siècle*."

"Business is good with us, and we are at present constructing several large plants. We expect to do more with the assistance of your enterprising paper.

"Yours truly,

"THE SIMPSON BRICK PRESS CO.

"Chicago."

BICKEL BROS. CONTRACTING COMPANY, St. Louis, Mo., are putting a kiln upon the market that is spoken of in highest terms by those using it. The kiln is built on scientific plans, and is eminently practical in operation, being the outcome of long experience in the proper arrangement of kilns, as demonstrated by actual test. The kiln is built strong and to any size desired, is adapted to burning all kinds of brick and pottery goods. Being simple and economical in operation, it does not require an expert to handle it. Any burner who understands his business can easily manage it.

WE are in receipt of a letter from a manufacturer asking if clays are likely to be injured in drying processes by machinery. In reply we clip the following extract from the *British Clayworker*, April, 1894, London, England: —

"It at once occurred to our representative that there might be a danger of driving off the water of hydration as well as that of porosity, in which case the clay would be 'porished,' as the clay-workers say, and its strength and plasticity seriously impaired. Accordingly, Mr. Cummer and Mr. Erith, who were present, gave him leave to take away any portion of the dried clay for examination. This was done, and the sample analyzed in the laboratory, with the result that the clay, though dry, was found to be absolutely uninjured. So much for the scientific opinion, and in addition it may be noted that the proprietors of the works that our representative visited, where this machine is in operation, are well pleased with their investment, and none are more competent to give a practical opinion."

We would add that the dryer referred to above was that manufactured by F. D. Cummer & Son, Cleveland, O.

THE progressive, "get there" clayworkers of this country are ever on the watch for increasing their sales as well as making stock to fill them. They watch the market and are alive to every opportunity of placing new orders. They appreciate that the market side is the important side, and they are working to develop it, knowing that equipment for increased output is easily obtainable. THE BRICKBUILDER naturally interests and appeals to this class of the clayworking community, and it is this class that keep their equipment abreast of the times.

Clay Materials.

WHERE is Philadelphia? Just outside the Jarden Brick Company's yard.

MESSRS. PFOTENHAUER & NESBITT, Metropolitan Building, New York, have taken the New York agency for the Jarden Brick Company of Philadelphia.

THE American Enamel Brick and Tile Company, Wm. A. Pfingsthorn, secretary and treasurer, Mohawk Building, New York, who have produced some of the handsomest enamelled brick yet seen, expect to complete their new factory and begin operations Oct. 1.

MR. H. F. MAYLAND, formerly of the firm of Engelhardt & Mayland, takes up the sole selling agency of the Industrial Brick Company of May's Landing, N. J. This company manufactures a particularly fine grade of front brick in all colors. A full line of samples may be seen at Mr. Mayland's office, 613 United Charities Building 287 Fourth Avenue, New York City.

THE Akron Vitrified Pressed Brick Company, Akron, O., write us that they are receiving many good orders from different section of the country, where their bricks have been used before. This must certainly be gratifying to the company, for it shows that the merits of their bricks are appreciated, and winning for themselves an enviable reputation wherever they are placed.

THE Somerset and Johnsburg Manufacturing Company, Boston, inform us that they have completed the shipment of enamel bricks that are to go into the Carnegie library, Pittsburg. Their contract was for some ninety thousand white enamel brick, many of which were of special shape. More than half of the brick are already set, and the company have received many gratifying comments on the same.

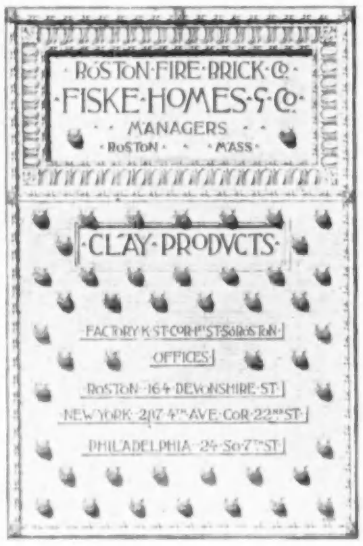
MR. W. H. GATES of Boston has added another string to his bow by practically absorbing the Gay Head Clay and Brick Company, formerly the Chelsea Fire Brick Works of Chelsea, Mass. He has just closed a contract under which he takes the entire product of the works. The capacity of the plant has been increased and Mr. Gates stands in a position to talk business with any one wanting fire brick, cupola blocks, boiler tiles, special shapes, etc., as well as everything in the front brick line.

THE new Jefferson Hotel of Richmond, Va., Messrs. Carrère & Hastings, architects, is being built of a white brick made by the Powhatan Clay Company of the same city. The brick differs from other white brick, inasmuch as the face, although not rough, is not intended to be absolutely smooth, and its color is not a glaring white, but rather more of a delicate cream tint. The effect when laid in the wall is beautiful. Part of the walls was laid last December and as yet has shown no signs of greening.

THE enamel terra-cotta front that is to go into the Reliance Building in Chicago will make that building one of great interest to the building fraternity. It is by far the largest undertaking in enamel terra-cotta construction that has ever been made. The terra-cotta is to be supplied

by the Northwestern Terra-cotta Company, Chicago. From the specimens of the enamel work which we saw at the company's factory, we predict a grand effect when the building is complete.

It is fair to presume that a great popularity will follow this kind of structure.



The above cut is a reduced fac-simile of the cover design of Fiske, Homes & Co.'s new catalogue. It is a very handsome publication, and an example of the work of the Collins Press, whose creditable work is apparent in THE BRICKBUILDER. This catalogue illustrates buildings furnished with clay materials by Fiske, Homes & Co., a series of fine brick and terra-cotta mantels, one of which is illustrated on page 120, numerous stock patterns of terra-cotta detail, etc., etc.

THE "brickyard" of to-day would be indeed a revelation to any one visiting it for the first time. With its modern appliances for drying and burning, its ponderous machines for pressing the brick, producing thousands per day for each machine, its blacksmith and machine shops, and its corps of skilled foremen and draughtsmen, it has taken its place among the leading industries of our time.

To successfully operate such a plant, representing an investment of hundreds of thousands of dollars in many cases, where economy in production and quality of same are the essential elements of success, requires the most careful attention to every detail. One of the largest companies in this section of the country is the Eastern Hydraulic-Press Brick Company of Philadelphia, Mr. Henry Mack, manager. To those who are interested in the modern method of brickmaking, Mr. Mack takes great delight in showing over the company's works, which are situated at Winslow Junction, N. J., near Philadelphia.

A NEW concern that is sure to take its place among the leaders in its line is the Excelsior Terra-Cotta Company. This company was organized Feb. 1, 1894, to succeed Messrs. Partridge, Powell & Storer. The offices of the company are at 287 Fourth Avenue, New York, and its factory at Rocky Hill, New Jersey, on the Delaware & Raritan Canal, about half way between Philadelphia and New York. The clay which is taken from the beds owned by the company is pronounced by experts to be of the finest quality. The location of the company's works could not be excelled for shipping purposes, as transportation is obtained by rail or water, and being about half way between the two large cities named.

The president of the company is Mr. Isaac A. Hopper, a successful New York business man and well known as the president of the Master Builders' Club of New York; vice-president, Col. A. N. Partridge of Brooklyn; treasurer and sales agent, Mr. W. H. Powell, formerly with the Perth Amboy Terra-Cotta Company.

Miscellaneous.

THE new home of the Baltimore Builders' Exchange meets all the requirements, and so does Secy. E. D. Miller.

MR. ANTHONY ITTNER of St. Louis has put a line of mortar colors on to the market. They are as good as his brick, and no higher praise could be given them.

MR. CHARLES HEWITT, well known as the president of the New Jersey Steel and Iron Company, Trenton, N. J., has been elected president of the Metropolitan Fire-Proofing Company, formerly the Manhattan Fire-Proofing Company.

MR. MORRIS EBERT of Philadelphia, American agent for the Mannheimer Cement, reports that during the past year he imported double the amount of this cement of any previous year, which must be allowed is good evidence that this excellent German brand is meeting all the stringent requirements for building.

THE Expanded Metal Company are putting on the market a very valuable process wherein a metal mesh is used for fireproof lathing. The principle is that of a net or mesh, peculiarly constructed and so designed that it contains the best qualities of a proper surface to plaster and cement upon. By using light, three-quarter-inch steel channels, set sixteen inches apart, and then sheets of expanded metal lashed to them, a foundation for their new scheme of solid plaster partitions is formed. The extreme lightness of the structure, its fireproof qualities, and the fraction of space occupied are a strong recommendation in its favor. A number of buildings have used this expanded metal mossatisfactorily, among which may be ment tioned the Carter Building, the Penn Mutual Insurance Building, and the new Boston & Maine Station; and the new Tremont Temple will have this construction throughout.

MR. H. E. STREETER of 13 Exchange Street, Boston, has been seen recently with a common brick of high enough quality to serve in most cases as a face brick. It is the product of the Hartford Brick Company, and one of the best common sand struck brick we have seen. It can be delivered f. o. b. in Boston for about $8.50, and the orders Mr. Streeter has already placed will start a good many carloads this way. Any one in New England wanting a particularly fine line of such brick will find it to their advantage to let Mr. Streeter make them a price.